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UNIVERSITY OF ALABAMA

Monthly  
Bulletin  
of the International  
Railway Congress Association  
(English Edition)





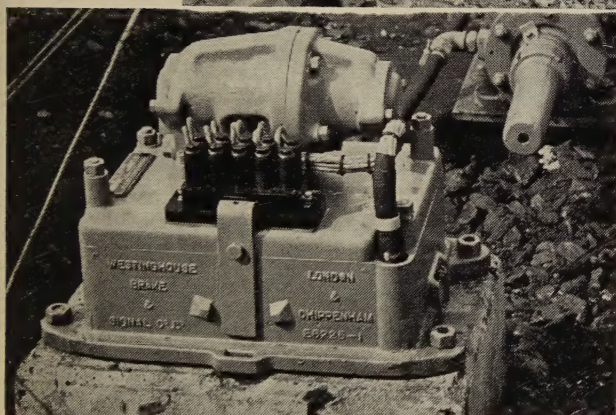




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EQUIPMENT  
FOR MODERN  
CONDITIONS**



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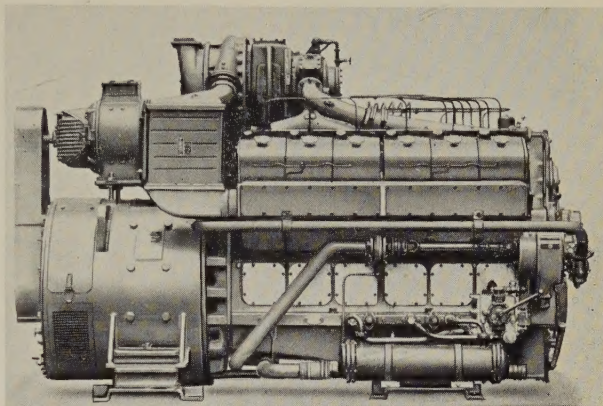
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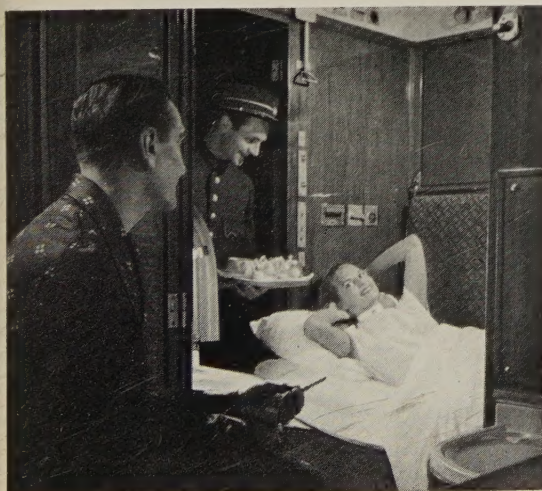
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High Speed Trains  
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VIA  
**DUNKERQUE TRAIN FERRY**

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8.43 a. m.	↓	Brussels M.	↑	9.15 p. m.







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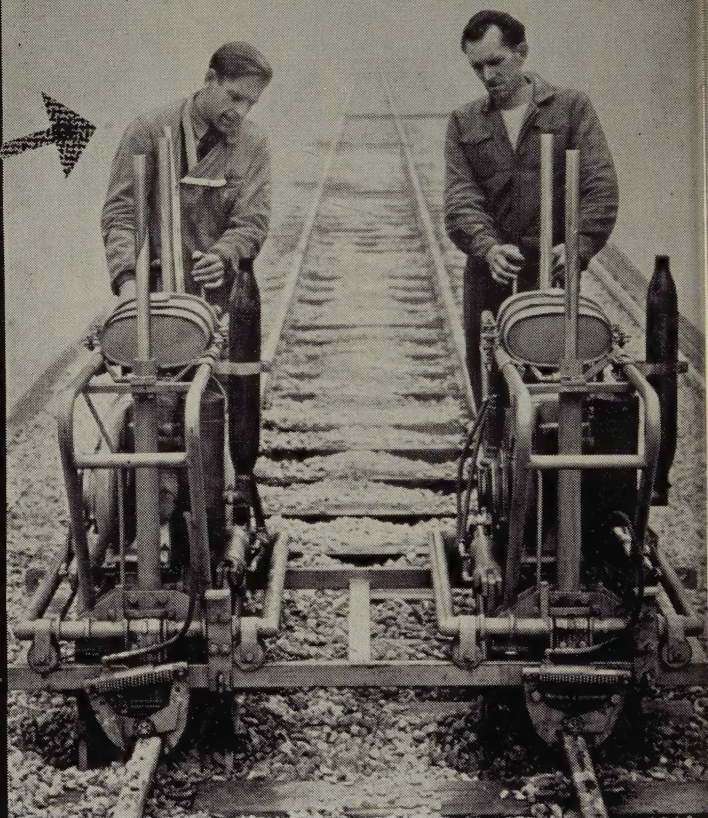
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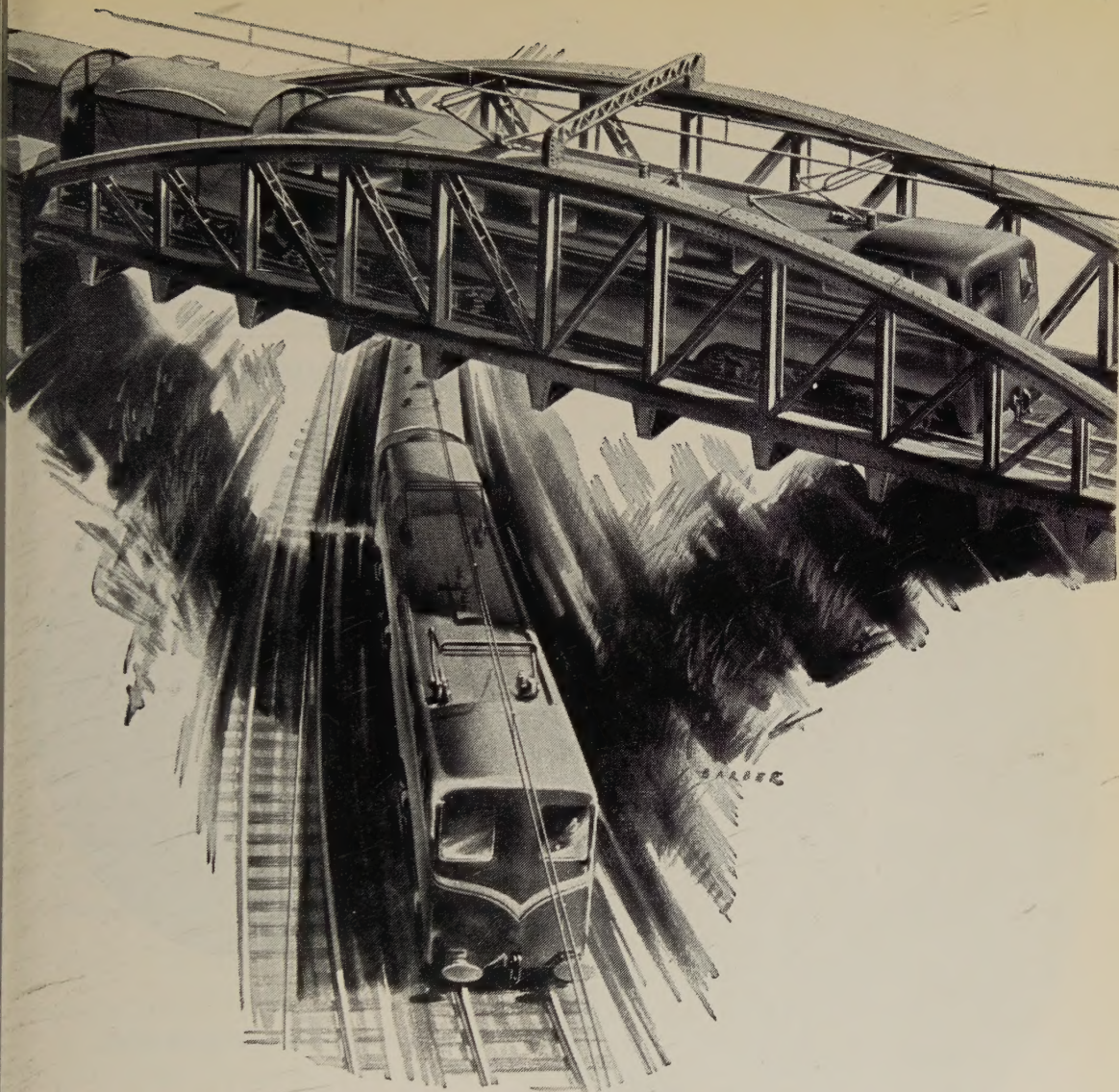
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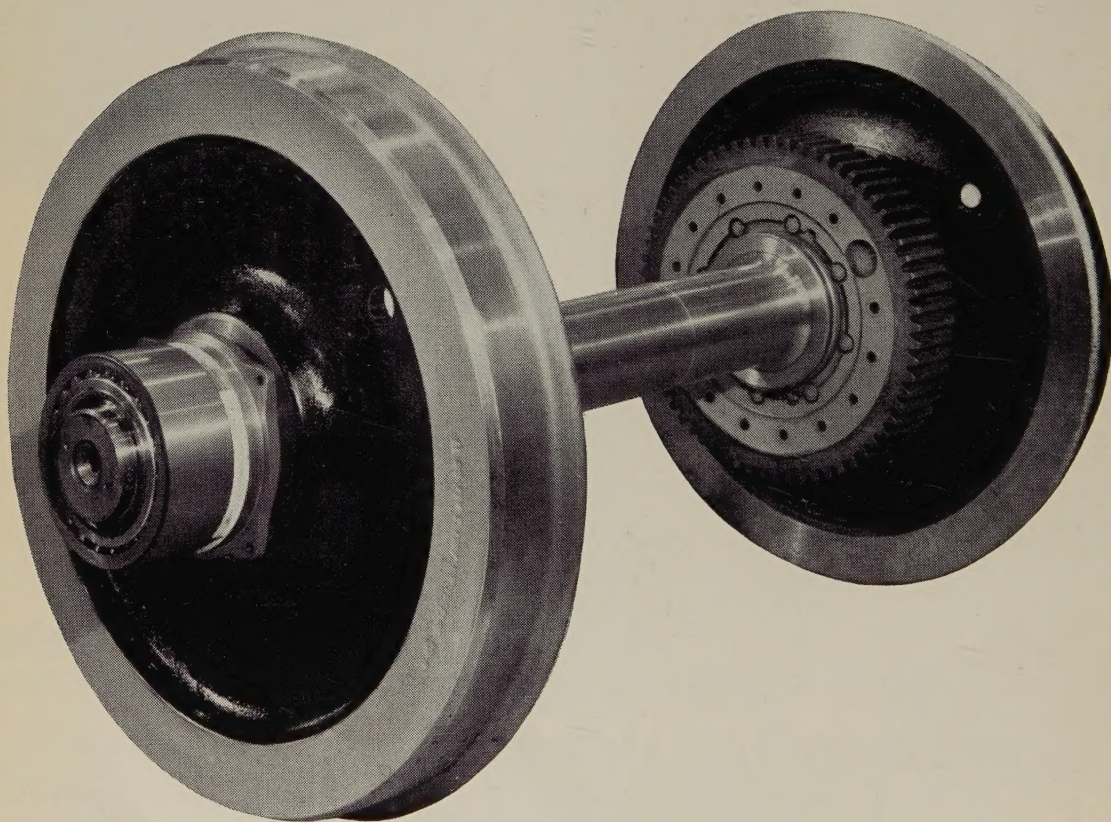
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**MONTHLY BULLETIN**  
OF THE  
**INTERNATIONAL RAILWAY CONGRESS ASSOCIATION**  
(ENGLISH EDITION)

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International Railway Congress Association, 19, rue du Beau-Site, Brussels (Belgium).

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Advertisements : All communications should be addressed to the Association,  
19, rue du Beau-Site, Brussels.

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**LIBRARY**  
OF THE  
**Permanent Commission of the International Railway Congress Association**

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READING ROOM : 19, rue du Beau-Site, Brussels.

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Works in connection with railway matters, which are presented to the Permanent Commission are mentioned in the « Bulletin ». They are filed and placed in the library. If the Executive Committee deems it advisable they are made the subject of a special notice. Books and publications placed in the reading room may be consulted by any person in possession of an introduction delivered by a member of the Association.

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*An edition in French is also published.*

# BULLETIN

OF THE

# INTERNATIONAL RAILWAY CONGRESS

## ASSOCIATION

(ENGLISH EDITION)

[ 385 (06 .112 )

## SEVENTEENTH SESSION

MADRID, 29th September to 7th October 1958

# SUMMARY OF PROCEEDINGS

## SUMMARY

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## List of the papers published.

Number of the question	TITLE OF THE QUESTION	DOCUMENTS	Year, month and page of the <i>English Bulletin</i>
<b>1st Section. — Way and Works.</b>			
1	Problems presented by the ageing of bridges and viaducts. Long term effects of fatigue and corrosion in steel bridges and weathering of masonry. Rational methods of maintenance of bridges. Repair and strengthening.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Egypt, Western Germany, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by Fr. Lemmerhold.	May 1958, p. 639.
		Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Vietnam and Yugoslavia), by Dr.-Ing. G. Cividalli.	June 1958, p. 821.
2	Very long rails. Welding methods. Transport of long welded rails and necessary equipment for transporting, laying, fixing, ballast, tamping, etc. Economic aspect of the question. Present tendencies.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by F. Jackson.	March 1958, p. 379.
		Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Union of Soviet Socialist Republics, Viet-Nam and Yugoslavia), by A. Crespo Mocerrea.	August 1958, p. 1147.



Number of the question	TITLE OF THE QUESTION	DOCUMENTS	Year, month and page of the English <i>Bulletin</i>
<b>2nd Section. — Locomotives and rolling stock.</b>			
3	Design and improvement of railcars and multiple-unit Diesel trains, as regards: traction power equipment (location and suspension of the engine, type of transmission); characteristics of the construction (body and bogies); weight reduction; sound-proofing, heating, ventilation, air conditioning (supply of power required, advantages and drawbacks); buffer and traction gear. Intercommunication.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Egypt, Western Germany, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by Dr.-Ing. G.A. Gaebler.	February 1958, p. 145.
		Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Viet-Nam and Yugoslavia), by A.S. Canavezes Jr.	April 1958, p. 499.
		Supplement to Report, by A.S. Canavezes Jr.	August 1958, p. 1261.
4	Comparative study of the periodical maintenance and repair of electric locomotives, in particular as regards: the wear of the tyres (influence of the wheel diameter, the axle-load, the speed, the type of bogies and eventually undulatory wear of the rails, etc.); the maintenance of traction motors and their transmission (flash at the collectors and methods of coping with it, use of roller bearings for the suspension of the motors and the hollow shafts, etc.); lubricants used (classical and such new types as bisulphide of molybdenum); wear of the friction strips of the pantographs. Kind of work and periodicity. Organisation of the maintenance and influence of common user (banalisation) of the locomotives. Prime cost in relation to the type of equipment and the age of the engines.	Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by K.J. Cook.	March 1958, p. 219.
		Supplement to Report, by K.J. Cook.	August 1958, p. 1279.
		Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Union of Soviet Socialist Republics, Viet-Nam and Yugoslavia), by Mario Viani.	July 1958, p. 1025.
<b>3rd Section. — Working.</b>			
5	a) Handling facilities in the goods depots for consignments in less than carloads, containers. General arrangement of the depots. Liaisons between the staff of the depot and the delivery services. b) Railway problems regarding the introduction of general palletisation of packages.	Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Viet-Nam and Yugoslavia), by M. Marchand.	April 1958, p. 447.
		Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, Netherlands, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by J. Dorjee.	March 1958, p. 231.



Number of the question	TITLE OF THE QUESTION	DOCUMENTS	Year, month and page of the English <i>Bulletin</i>
6	When changing over to electric and Diesel traction for passenger train services, research of the principles which may lead to a rational and efficient organisation of same. For this purpose to : work out the social and economic needs and with this object in view, classify the passenger services according to the needs of the populations served, the distances, the volume of passenger traffic and its variations; fix, for each category, the traffic hours and advisable frequencies as well as the reasonable requirements of the public for comfort and speed; define the most suitable methods to draw up the timetables (including eventually regular interval trains services) : choice of the type of train and rolling stock, fixing the runs.	<p>Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Union of Soviet Socialist Republics, Viet-Nam and Yugoslavia), by R. Carlier.</p> <p>Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by G.F. Fiennes.</p>	<p>February 1958, p. 85.</p> <p>February 1958, p. 111.</p>
<b>4th Section. — General.</b>			
7	Advantage of the use of high speed electronic apparatus for certain administrative work such as : 1) the making out of pay slips; 2) traffic and stores accounts; 3) the checking of the movement of empty and loaded freight wagons, thereby improving the distribution of rolling stock; 4) compiling more rapidly already existing statistics, thus having also the possibility of preparing new ones.	<p>Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by Sten Ubbe.</p> <p>Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Viet-Nam, and Yugoslavia), by B.H. de Fontgalland.</p>	<p>April 1958, p. 435.</p> <p>May 1958, p. 695.</p>
8	Financing and conserving railway properties and assets. Study and comparison for limited companies, partially state-owned companies and State Railways, of the financial means used for the normal renewal of installations and rolling stock. Forms of amortisation and renewal, taking into account for the latter, the slow or speedy depreciation of the currency.	<p>Report (Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Viet-Nam and Yugoslavia), by W. Keller.</p> <p>Report (America (North and South), Australia (Commonwealth of), Austria, Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by V. Felder.</p>	<p>March 1958, p. 361.</p> <p>May 1958, p. 725.</p>



Number of the question	TITLE OF THE QUESTION	DOCUMENTS	Year, month and page of the English <i>Bulletin</i>
<b>5th Section. — Light Railways and Colonial Railways.</b>			
9	Experience obtained concerning the undulatory wear of rails : damaging effects on the track, bridges, viaducts and tunnels, and on the rolling stock; research into the causes of this kind of wear; measures taken to avoid or to remedy it.	<p>Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by N.C. Vogan.</p> <p>Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Union of Soviet Socialist Republics, Viet-Nam and Yugoslavia), by Luis Prieto Delgado.</p> <p>Addendum to Report by Luis Prieto Delgado.</p>	<p>May 1958, p. 747.</p> <p>June 1958, p.963.</p> <p>August 1958, p. 1303.</p>
10	In view of the development of light railways, what are the means to be adopted in order to reduce the operating costs of these railways and what are the resulting basic amendments? Delimitation of electrification and dieselisation in relation to the traffic, capital costs and operating costs; co-ordination between rail and road : possibilities of mixed rail-road vehicles and of specialised vehicles for rail or road; principles to be followed in regard to investment, in order to improve the returns from the capital available for the transport industry.	<p>Report (America (North and South), Australia (Commonwealth of), Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by S.L. Kumar.</p> <p>Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Viet-Nam and Yugoslavia), by Dr.-Ing. Ernesto Stagni.</p>	<p>July 1958, p. 1081.</p> <p>August 1958, p. 1215.</p>

# PROGRAMME OF EVENTS.

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## Sunday, September 28.

*Morning, from 10 a.m. to 1 p.m.* — Registration of Delegates.

*Afternoon, from 3.30 p.m. to 6 p.m.* — Registration of Delegates.

## Monday, September 29.

*Morning, from 9 a.m. to 12 noon.* — Registration of Delegates.

*At 11 a.m.* — Meeting of the Permanent Commission.

*Afternoon, from 3 p.m. to 5 p.m.* — Registration of Delegates.

*At 5 p.m.* — Opening Ceremony under the Presidency of His Exc. Sr. D. Jorge VIGON, Minister of Public Works.

*At 8 p.m.* — Reception by the Spanish Government in honour of Delegates.

## Tuesday, September 30.

*Morning, from 9 a.m. to 12 noon.* — Registration of Delegates.

*At 9.30 a.m.* — Sectional Meetings.

*Afternoon, at 3 p.m.* — Technical Visits and Sightseeing tours (\*).

*At 7 p.m.* — Reception of the Delegates by the Madrid Municipality.

---

(\*) Programme of *Technical Visits* arranged for the afternoons of the 30th September, 1st, 2nd, 3rd and 6th October :

1. Railway links of Madrid and underground station known as Nuevos Ministerios.
2. Visit of the RENFE steam fuel and diesel traction installations at Cerro-Negro.
3. Visit of the Permanent Exhibition of the National Institute of Industry.
4. Visit of the workshops of the Talgo trains at Aravaca.
5. Visit to the Higher Council for Scientific Research.

\* \* \*

N.B. — For particulars of these visits, please see pages 215 of this *Bulletin*.

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## Wednesday, October 1.

*Morning, at 9.30 a.m.* — Sectional Meetings.

*Afternoon, at 3 p.m.* — Technical Visits and Sightseeing tours.

## Thursday, October 2.

*Morning, at 9.30 a.m.* — Sectional Meetings.

*Afternoon, at 3 p.m.* — Technical Visits and Sightseeing tours.

*At 7 p.m.* — Basque « Pelota » game.

## Friday, October 3.

*Morning, at 9.30 a.m.* — Plenary Session.

*Afternoon, at 3 p.m.* — Technical Visits and Sightseeing tours.

*At 9 p.m.* — Official Congress Dinner.

## Saturday and Sunday, October 4 and 5.

One-day excursions offered by the Spanish Organizing Commission.

## Monday, October 6.

*Morning, at 9.30 a.m.* — Sectional Meetings.

*Afternoon, at 3 p.m.* — Technical Visits and Sightseeing tours.

*At 10 p.m.* — Gala performance at the Zarzuela Theatre.

## Tuesday, October 7.

*Morning, at 9.30 a.m.* — Sectional Meetings.

*Afternoon, at 11 p.m.* — Plenary Session.

*At 4.30 p.m.* — Closing Ceremony graced by the presence of this Exc. Sr. D. Francisco FRANCO BAHAMONDE, Jefe del Estado.

*Evening.* — Departure of two-day excursions to Seville, Granada and Barcelona.

## Wednesday, October 8.

*Morning.* — Departure of two-day excursions to Granada, Seville and the Cities of Castille.

## Thursday and Friday, October 9 and 10.

Continuation and end of two-day excursions offered by the Spanish Organizing Commission.



# List of the participating Administrations and adherent Organisations.

(Position on 1st September 1958.)

ADMINISTRATIONS	Kilo- metres	ADMINISTRATIONS	Kilo- metres
<b>ARGENTINE.</b>		<b>BRAZIL.</b>	
Chemins de fer de l'Etat . . . . .	17 673	Compagnie des Chemins de fer de Rio Grande do Sul. . . . .	3 644
<b>AUSTRIA.</b>		<b>BULGARIA.</b>	
Chemins de fer Fédéraux Autrichiens.	5 981	Chemins de fer de l'Etat. . . . .	3 280
<b>BELGIUM, BELGIAN CONGO AND RUANDA-URUNDI.</b>		<b>CZECHOSLOVAKIA.</b>	
a) <i>Belgium</i> :		Chemins de fer de l'Etat . . . . .	13 196
Société Nationale des Chemins de fer belges. . . . .	4 838	<b>DENMARK.</b>	
Société Nationale des Chemins de fer vicinaux. . . . .	1 865	Chemins de fer de l'Etat . . . . .	2 685
Compagnie Générale d'Entreprises électriques et industrielles « Electrobél »	38	Chemin de fer privé d'Aalborg . . . .	259
Railways économiques de Liège-Seraing et extensions . . . . .	21	Chemin de fer de Lolland-Falster . . .	104
Compagnie belge de Chemins de fer et d'Entreprises . . . . .	28	<b>EGYPT.</b>	
b) <i>Belgian Congo and Ruanda-Urundi</i> :		Chemins de fer de la République. . .	4 733
Chemins de fer du Bas-Congo au Kattanga . . . . .	2 612	<b>FINLAND.</b>	
Chemins de fer du Congo Supérieur aux Grands Lacs Africains. . . . .	849	Chemins de fer de l'Etat . . . . .	5 028
Chemins de fer Vicinaux du Congo. . .	839	<b>FRANCE AND FRENCH UNION.</b>	
Office d'Exploitation des Transports Coloniaux (OTRACO). . . . .	600	a) <i>France (Metropolitan)</i> :	
<b>BURMA.</b>		Société Nationale des Chemins de fer français . . . . .	39 602
Burma Railways . . . . .	2 875	Chemins de fer Départementaux. . . .	278

ADMINISTRATIONS	Kilo- metres	ADMINISTRATIONS	Kilo- metres
Société Générale des Chemins de fer Economiques . . . . .	1 362	b) <i>Australia :</i>	
Chemins de fer Economiques du Nord.	121	New South Wales Government Railways.	9 835
Régie Autonome des Transports Pari- siens . . . . .	186	Tasmanian Government Railways. . .	909
Chemins de fer Secondaires du Nord-Est	65	Victorian Government Railways. . . .	7 092
Compagnie Générale d'Exploitations Ferroviaires et Routières . . . . .	186	c) <i>New Zealand :</i>	
b) <i>Other territories of the French Union :</i>		New Zealand Government Railways . .	5 578
<b>Africa.</b>		d) <i>Union of South Africa :</i>	
Chemins de fer Algériens . . . . .	4 365	South African Railways and Harbours.	21 631
Chemins de fer de l'Afrique Equatoriale française . . . . .	497	e) <i>India :</i>	
Chemins de fer du Cameroun . . . . .	517	Indian Government Railways . . . . .	55 914
Régie des Chemins de fer de l'Afrique occidentale française . . . . .	3 724	f) <i>Ceylon :</i>	
Chemin de fer du Togo. . . . .	492	Ceylon Government Railway . . . . .	1 444
Chemin de fer franco-éthiopien de Dji- bouti à Addis-Abeba. . . . .	783	g) <i>Federation of Rhodesia and Nyasaland :</i>	
Chemins de fer de Madagascar. . . . .	859	Rhodesia Railways . . . . .	4 358
Chemin de fer de la Méditerranée au Niger . . . . .	275	Nyasaland Railways. . . . .	508
<b>Asia.</b>		h) <i>Ghana :</i>	
Régie des Chemins de fer du Viêt- Nam . . . . .	1 176	Ghana Railway. . . . .	885
Chemins de fer Royaux du Cambodge.	385	<b>GREECE.</b>	
<b>GERMANY (Western).</b>		Chemins de fer de l'Etat hellénique. . .	1 694
Deutsche Bundesbahn . . . . .	30 509	Chemin de fer Pirée-Athènes-Péloponèse	815
<b>THE COMMONWEALTH.</b>		<b>HUNGARY.</b>	
a) <i>The United Kingdom of Great Britain and Northern Ireland and dependent overseas territories :</i>		Chemins de fer de l'Etat hongrois . . .	7 783
British Railways . . . . .	30 554	<b>INDIA.</b>	
London Transport Executive . . . . .	358	(see <i>The Commonwealth</i> ).	
East African Railways and Harbours.	5 438	<b>INDONESIA.</b>	
Nigerian Railway . . . . .	2 864	Chemins de fer de l'Etat Indonésien. . .	6 102
Malayan Railway . . . . .	1 654	<b>IRAN.</b>	
		Chemins de fer de l'Etat Iranien. . . .	1 956



ADMINISTRATIONS	Kilo- metres	ADMINISTRATIONS	Kilo- metres
<b>IRAQ.</b>		<b>PORTUGAL AND OVERSEAS TERRITORIES.</b>	
Iraqi State Railways . . . . .	1 669	a) <i>Continent :</i>	
<b>REPUBLIC OF IRELAND.</b>		Compagnie des Chemins de fer Portu- gais . . . . .	3 571
Coras Iompair Eireann. . . . .	3 087	b) <i>Overseas Territories :</i>	
<b>ITALY.</b>		Chemins de fer de l'Angola . . . . .	977
Chemins de fer de l'Etat . . . . .	16 704	Chemin de fer du Benguela . . . . .	1 348
Chemins de fer de la Méditerranée. .	845	Chemin de fer du Mozambique . . . . .	1 999
Société Nationale des Chemins de fer et de Tramways . . . . .	109		
Chemins de fer du Nord de Milan. . .	243	<b>RUMANIA.</b>	
Ferrovie del Sud-Est . . . . .	475	Chemins de fer Roumains . . . . .	9 767
S.A. Torinese Tramvie Intercomunali .	200		
Société Vénitienne pour la Construction et l'Exploitation de Chemins de fer secondaires en Italie . . . . .	222	<b>SPAIN.</b>	
<b>JAPAN.</b>		Red Nacional de los Ferrocarriles Espa- ñoles (R.E.N.F.E.) . . . . .	13 137
Japanese National Railways. . . . .	20 046	Compagnie Générale des Chemins de fer Catalans . . . . .	145
<b>LEBANON.</b>		<b>SUDAN.</b>	
Chemin de fer de Damas-Hama et prolongements . . . . .	413	Sudan Railways . . . . .	4 540
<b>LUXEMBURG.</b>		<b>SWEDEN.</b>	
Société Nationale des Chemins de fer Luxembourgeois . . . . .	393	Chemins de fer de l'Etat . . . . .	14 847
<b>MOROCCO.</b>		Chemin de fer Nora-Bergslagen . . . .	173
Chemins de fer du Maroc . . . . .	1 091	Chemin de fer Nordmark-Klarälven . .	171
<b>NORWAY.</b>		Chemin de fer Oxelösund-Flen-Västman- land . . . . .	300
Chemins de fer de l'Etat . . . . .	4 381	Chemin de fer Stockholm-Roslagen. .	288
<b>NETHERLANDS.</b>		<b>SWITZERLAND.</b>	
Chemins de fer Néerlandais, S.A. . .	3 222	Chemins de fer fédéraux . . . . .	2 910
<b>POLAND.</b>		Chemins de fer des Alpes bernoises (Berne-Loetschberg-Simplon) . . . .	253
Chemins de fer de l'Etat. . . . .	23 427	Chemin de fer Rhétique . . . . .	391
		Chemin de fer de Viège à Zermatt . . .	44
		Chemin de fer d'Yverdon à Sainte-Croix	25
		Chemins de fer Fribourgeois. . . . .	100
		Chemin de fer Emmental-Burgdorf-Thun	170

ADMINISTRATIONS	Kilo- metres	ADMINISTRATIONS	Kilo- metres
<b>SYRIA.</b>		<b>UNITED STATES OF AMERICA.</b>	
Chemins de fer de l'Etat Syrien. . . .	600	Delaware and Hudson Railroad Corpo- ration. . . . .	1 230
<b>TUNISIA.</b>		Long Island Railroad . . . . .	634
Société Nationale des Chemins de fer Tunisiens . . . . .	1 610	<b>URUGUAY.</b>	
Chemin de fer de Gafsa . . . . .	402	Uruguayan State Railways. . . . .	2 957
<b>TURKEY.</b>		<b>YUGOSLAVIA.</b>	
Chemins de fer et Ports de l'Etat turc . .	7 802	Chemins de fer de la République Popu- laire Fédérative de Yougoslavie . . .	11 170
<b>UNION OF SOVIET SOCIALIST REPUBLICS.</b>			
Soviet State Railways . . . . .	120 700		

#### AFFILIATED ORGANISATIONS

Association of American Railroads.  
 Compagnie Auxiliaire Internationale de Chemins de fer.  
 Compagnie Internationale des Wagons-Lits et des Grands Express Européens.  
 Deutsche Schlafwagen- und Speisewagen Gesellschaft.  
 Federazione Nazionale Imprese Trasporti.  
 Office Central des Transports Internationaux par Chemins de fer.  
 Union Internationale des Chemins de fer.  
 Union des Chemins de fer Privés Suédois (Svenska Järnvägsföreningen).  
 Union d'Entreprises Suisses de Transport.  
 Union des Voies Ferrées.



# GENERAL LIST OF DELEGATES

*Note.* — An asterisk (\*) means that a delegate is already a member of the Congress in some other capacity, this latter being inserted in brackets.

◆ = Present in Madrid.

## I. — Delegates of the Permanent Commission.

### A. — PERMANENT COMMISSION.

#### *President :*

◆ **M. De Vos**, Directeur Général de la Société Nationale des Chemins de fer belges.

#### *Vice-presidents :*

◆ **J. Goursat**, Directeur de la Région du Nord de la Société Nationale des Chemins de fer français.

◆ **M. Crem**, Directeur du Service de l'Exploitation de la Société Nationale des Chemins de fer belges.

#### *Members of the Executive Committee :*

◆ **E. Dorges**, Secrétaire Général Honoraire aux Travaux Publics et aux Transports, Délégué Général aux Affaires Internationales du Ministère des Travaux Publics, des Transports et du Tourisme (France).

◆ **Sir John Benstead**, Deputy Chairman of the British Transport Commission.

◆ **Sir Gilmour Jenkins**, Permanent Secretary, Ministry of Transport and Civil Aviation (Great Britain).

#### *Ex-Presidents of Session, ex-officio members :*

Dr.-Ing. **G. di Raimondo**, Directeur Général des Chemins de fer italiens de l'Etat (*retired*).

**Ibrahim Fahmy Kerim**.

Dr. **W. Meile**, ancien Président de la Direction Générale des Chemins de fer fédéraux suisses.

◆ General **Sir Brian Robertson**, Bart., G.C.B., G.B.E., K.C.M.G., K.C.V.O., D.S.O., M.C., Chairman, British Transport Commission.

#### *Members :*

◆ **E.T. Aalto**, Directeur Général des Chemins de fer de l'Etat de Finlande.

◆ **M. Afifi**, Directeur Général Adjoint des Chemins de fer de la République d'Egypte.

◆ **L. Armand**, ancien Président du Conseil d'Administration de la Société Nationale des Chemins de fer français.

◆ Dr.-Ing. **A. Attisani**, Chef du Service du Matériel et de la Traction des Chemins de fer italiens de l'Etat (*retired*).

◆ **Abdel Moneim Azmy**, Sous-Secrétaire d'Etat au Ministère des Communications d'Egypte.

◆ **R. Besnard**, Chef de Service Adjoint au Directeur Général des Chemins de fer et des Transports, Ministère des Travaux Publics, des Transports et du Tourisme (France).

◆ **David Blee**, General Manager, London Midland Region, British Railways.

◆ **Dr. H. Born**, Directeur de l'Union d'Entreprises Suisses de Transport.

◆ **Ch. Boyaux**, Directeur Général Honoraire de la Société Nationale des Chemins de fer français.

◆ **Dipl.-Ing. A. Brill**, Ministerialdirektor, Leiter der Maschinentechnischen- und Beschaffungsplanungsabteilung der Hauptverwaltung der Deutschen Bundesbahn.

◆ **A. Brouckaert**, Directeur du Service du Matériel et des Achats de la Société Nationale des Chemins de fer belges.

◆ **E. Clarembaux**, Directeur du Service de la Voie de la Société Nationale des Chemins de fer belges.

◆ **Dr. R. Cottier**, Directeur de l'Office Central des Transports Internationaux par Chemins de fer.

◆ **T.C. Courtney**, Member of the Coras Iompair Eireann.

◆ **G. Csanadi**, Premier Ministre Adjoint des Communications et des Postes de Hongrie.

◆ **Dr.-Ing. A. Cuttica**, Directeur Général Adjoint et Conseiller d'Administration des Chemins de fer italiens de l'Etat.

◆ **Ph. Dargeou**, Directeur Général de la Société Nationale des Chemins de fer français.

◆ **J. de Aguinaga**, Directeur Adjoint du Réseau National des Chemins de fer espagnols.

◆ **F.Q. den Hollander**, Président des Chemins de fer néerlandais, S.A.

◆ **E. Derijkere**, Directeur du Service de l'Electricité et de la Signalisation à la Société Nationale des Chemins de fer belges.

◆ **M. Dias Trigo**, Directeur des Services d'Exploitation et du Matériel de la Direction des Transports terrestres au Ministère des Communications du Portugal.

◆ **G.H. Dijkmans van Gunst**, Conseiller au Ministère des Transports et du Waterstaat (Pays-Bas).

◆ **Sir John Elliot**, Chairman of the London Transport Executive.

◆ **Mohamed Halim El-Rashid**, Directeur Général des Chemins de fer de la République d'Egypte.

◆ **W.T. Faricy**, President, Association of American Railroads.

◆ **Ing. A. Florena**, Directeur Général Adjoint des Chemins de fer italiens de l'Etat.

◆ **J.M. Garcia-Lomas**, Vice-Président du Conseil d'Administration du Réseau National des Chemins de fer espagnols.

◆ **H. Geitmann**, Präsident der Deutschen Bundesbahn.

◆ **Dr. Ing. P. Globbe**, Directeur du Service du Personnel et des Affaires Générales des Chemins de fer de l'Etat italien.

◆ **K.W.C. Grand**, General Manager, Western Region, British Railways.

◆ **Dr. H. Gschwind**, Président de la Direction Générale des Chemins de fer fédéraux suisses.

◆ **R. Hoens**, Directeur Général de la Société Nationale belge des Chemins de fer vicinaux.

◆ **I.A. Ivanov**, Candidat des Sciences Techniques, Directeur de l'Institut scientifique des Chemins de fer de l'U.R.S.S.

◆ **M. Jacobshagen**, Ministerialdirektor, Leiter der Betriebsabteilung in der Hauptverwaltung der Deutschen Bundesbahn.

Dr.-Ing. **Moustapha Khalil**, Ministre des Communications d'Egypte.

**A. Kriz**, Ingénieur, Conseiller Supérieur de Section au Ministère des Communications de la République tchécoslovaque.

◆ **R. Kunz**, Directeur de l'Office fédéral des Transports (Suisse).

◆ **Dr. N. Laloni**, ancien Directeur Général Adjoint des Chemins de fer italiens de l'Etat. Suppléant du Ministre des Transports à la C.E.M.T.

◆ **Brig. Ch. A. Langley**, Chief Inspecting Officer of Railways, Ministry of Transport and Civil Aviation (Great Britain).

◆ **R. Lévi**, Directeur des Installations fixes de la Société Nationale des Chemins de fer français.

◆ **P. Lorenzo Ochando**, Director General de Ferrocarriles, Tranvías y Transportes por Carretera (Spain).

◆ **W.H. Maass**, Advisory Engineer to the High Commissioner for the Union of South Africa.

◆ **L.T. Madnani**, Railway Adviser to the High Commissioner for India in London.

◆ **M. Malderez**, Secrétaire Général du Ministère des Communications de Belgique.

◆ **Ing. F. Marin**, ancien Directeur Général Adjoint des Chemins de fer italiens de l'Etat.

◆ **R.F. Marriott**, Advisory Engineer, Representative of the New Zealand Government Railways in Great Britain.

◆ **P.C. Mukerjee**, Chairman, Railway Board, Ministry of Railways, Government of India.

◆ **J.P. Musquar**, Directeur Général de la Société Nationale des Chemins de fer luxembourgeois.

◆ **P. Nolet de Brauwere**, Secrétaire Général de la Société Nationale des Chemins de fer belges.

◆ **Prof. Dr. jur. H.M. Oeftering**, Vorsitz der Vorstandes und Erster Präsident der Deutschen Bundesbahn.

◆ **G. Olivier**, Administrateur de l'Office National pour l'achèvement de la Jonction Nord-Midi.

◆ **Dr.-Ing. V. Perrone**, Inspecteur Général Supérieur Honoraire du Ministère des Transports (Italie).

◆ **A. Plana**, Sous-Secrétaire d'Etat aux Travaux Publics et Président du Conseil d'Administration du Réseau National des Chemins de fer espagnols. Président de la Commission Locale Espagnole d'Organisation.

◆ **A. Porchez**, Directeur Général Adjoint Honoraire de la Société Nationale des Chemins de fer français.

◆ **J. Puig Batet**, Directeur du Réseau National des Chemins de fer espagnols.

◆ **J. Ratter**, Technical Adviser, British Transport Commission.

◆ **P. Renaud**, Vice-Président du Conseil d'Administration de la Société Nationale des Chemins de fer français.

◆ **Dr. Ing. S. Rissone**, Directeur Général des Chemins de fer italiens de l'Etat.

◆ **H. Saito**, Directeur du Département Etranger aux Chemins de fer Nationaux du Japon.

◆ **Dr. M. Schantl**, Directeur Général des Chemins de fer fédéraux autrichiens.

Dr. **F. Schelp**, Mitglied des Vorstandes und Präsident der Deutschen Bundesbahn.

**H.E. Simpson**, President, Baltimore and Ohio Railroad Company.

◆ **P.E.N. Skov**, Directeur Général des Chemins de fer de l'Etat danois.

◆ **R. Soulard**, Directeur du Mouvement de la Société Nationale des Chemins de fer français.

**H.E. Stokke**, Directeur Général des Chemins de fer de l'Etat norvégien.

◆ **Ing. J. Svagel**, Directeur de l'Institut Ferroviaire de la Direction Générale des Chemins de fer yougoslaves.

◆ **Sir J. Landale Train**, Member of the British Transport Commission.

◆ **J. Tuja**, Secrétaire Général de l'Union internationale des Chemins de fer.

◆ **E. Upmark**, Directeur Général des Chemins de fer de l'Etat suédois.

◆ **R. Vaubourdolle**, Chef Adjoint des Installations Fixes de la Société Nationale des Chemins de fer français.

◆ **F. Perez Villamil**, Directeur Adjoint du Réseau National des Chemins de fer espagnols.

**W. White**, President, Delaware & Hudson Railroad Corporation.

◆ **Dr.-Ing. W. Wyrzykowski**, Vice-Directeur de l'Institut Scientifique des Essais et des Recherches Ferroviaires des Chemins de fer de l'Etat polonais.

#### *Honorary President :*

◆ **F.H. Delory**, Directeur Général Honoraire de la Société Nationale des Chemins de fer belges.

#### *Members of Honour :*

**O.V.S. Bulleid**, former Chief Mechanical Engineer, Coras Iompair Eireann, and former Chief Mechanical Engineer, Southern Region, British Railways.

◆ **R. da Costa Couvreur**, ancien Président du Conseil supérieur des Travaux Publics au Ministère des Travaux Publics et des Communications du Portugal.

◆ **P. Ghilain**, Directeur Honoraire du Service du Matériel et des Achats de la Société Nationale des Chemins de fer belges, Secrétaire Général de l'Association.

◆ **Ranald J. Harvey**, Consulting Engineer.

◆ **The Rt. Hon. Lord Hurcomb**, G.C.B., K.B.E., Chairman, British Transport Commission 1947-1953.



◆ **U. Lamalle**, Directeur Général Honoraire de la Société Nationale des Chemins de fer belges, Professeur émérite de l'Université de Louvain.

*General Secretary :*

◆ **P. Ghilain (\*)**.

*Assistant Secretaries :*

- ◆ **F. Baeyens**, Ingénieur en Chef à la Société Nationale des Chemins de fer belges.
- ◆ **A. Jacobs**, Ingénieur en Chef à la Société Nationale des Chemins de fer belges.
- ◆ **P. Schoonjans**, Ingénieur Principal à la Société Nationale des Chemins de fer belges.
- ◆ **R. Squilbin**, Ingénieur Principal à la Société Nationale des Chemins de fer belges.

*Treasurer :*

◆ **V. Giot**, Chef-comptable à la Société Nationale des Chemins de fer belges.

*Chief of the Secretariat :*

◆ **J. Dumont**.

**B. — SPANISH LOCAL ORGANIZING COMMISSION.**

*President of Honour of the Session :*

◆ Excmo. Sr. D. Francisco **Franco Bahamonde**, Jefe del Estado.

*Vice-President of Honour :*

◆ Excmo. Sr. D. Jorge Vigón, Ministro de Obras Públicas.

**LOCAL ORGANIZING COMMISSION.**

*President :*

◆ Excmo. Sr. D. Agustín **Plana (\*)**, Subsecretario de Obras Públicas, Presidente del Consejo de Administración de la RENFE (Membre de la Commission Permanente.)

*Vice-Presidents :*

- ◆ **Pascual Lorenzo Ochando (\*)**, Director General de Ferrocarriles, Tranvías y Transportes por Carretera. (Membre de la Commission Permanente.)
- ◆ **José Maria Garcia-Lomas (\*)**, Vicepresidente del Consejo de Administración de la RENFE. (Membre de la Commission Permanente.)

*Members :*

- ◆ **José Puig Batet (\*)**, Director de la RENFE. (Membre de la Commission Permanente.)
- ◆ **Teoprédides Cuadrillero**, Director General de Aduanas.
- ◆ **Mariano Urzaiz**, Duque de Luna, Director General del Turismo.
- ◆ **José de Linos Lage**, Director General de Transportes del Ministerio del Ejército.
- ◆ **José Aniel-Quiroga**, Director General de Organismos Internacionales del Ministerio de Asuntos Exteriores.

◆ **Vicente Mortes**, Ingeniero C.C.yP. Director General de la Vivienda.

◆ **José Maria Peñaranda**, Delegado del Gobierno para la Ordenación del Transporte.

◆ **Anibal Carral**, Secretario General Técnico del Ministerio de Obras Públicas.

◆ **Carlos Roa**, Vicepresidente del Consejo Superior de Ferrocarriles y Transportes por Carretera y Director de la Compañía del Ferrocarril de Langreo.

◆ **Manuel Lamana**, Jefe Superior de Servicios de la Dirección General de Ferrocarriles, Tranvías y Transportes por Carretera.

◆ **Gabino Lorenzo Ochando**, Jefe de la Secretaría Técnica de la Dirección General de Ferrocarriles, Tranvías y Transportes por Carretera.

◆ **Tomás Garcia-Diego**, Delegado del Presidente del Instituto de Ingenieros Civiles de España.

◆ **Alfredo Mahou**, Presidente del Consejo Superior de las Cámaras de Industria y Navegación de España.

◆ **José Farre de Calzadilla**, Jefe Nacional del Sindicato Nacional de Transportes y Comunicaciones.

◆ **Luis Martín de Vidales**, Director de la Escuela Especial de Ingenieros de Caminos, Canales y Puertos.

◆ **Manuel Gonzalez y Gonzalez**, Director General de Correos y Telecomunicación.

◆ **Enrique Pastor**, Ingeniero Jefe de Concesión y Construcción de Ferrocarriles, Ministerio de Obras Públicas.

◆ **José Maria Huidobro**, Inspector General de la 9a Demarcación de Ferrocarriles.

◆ **Jacinto Julio Gonzalez**, Ingeniero Jefe de la División Inspector de la RENFE.

◆ **Luis Cubillo**, Ingeniero Jefe de la División Inspector e Interventora de Ferrocarriles de Vía Estrecha.

◆ **Federico Valenciano**, Ingeniero Director de la Explotación de Ferrocarriles por el Estado.

◆ **José Maria Otamendi**, Consejero Director de la Compañía Metropolitano de Madrid.

◆ **Pio Cela**, Ingeniero Jefe de la Sección de Explotación y Tráfico de Ferrocarriles, Ministerio de Obras Públicas.

◆ **Carlos Briñis**, Director de la Empresa Municipal de Transportes de Madrid.

◆ **Francisco Alvear**, Director de la Compañía del Ferrocarril del Cantábrico.

◆ **Manuel Soto Redondo**, Director de la Escuela Especial de Ingenieros Industriales.

**EXECUTIVE COMMITTEE.**

*President :*

◆ **José Maria Garcia-Lomas (\*)**, Vicepresidente del Consejo de Administración de la RENFE. (Membre de la Commission Permanente.)

*Vice-Presidents :*

◆ **José Puig Batet (\*)**, Director de la RENFE. (Membre de la Commission Permanente.)

◆ **Augusto Krahe**, Ingeniero Jefe de la 1ª Jefatura de Estudios y Construcciones de Ferrocarriles.

*Members :*

◆ **Faustino Perez Villamil (\*)**, Director Adjunto de la RENFE. (Membre de la Commission Permanente.)

◆ **José de Aguinaga (\*)**, Director Adjunto de la RENFE. (Membre de la Commission Permanente.)

- ◆ Alfredo Moreno, Director Adjunto de la RENFE.
- ◆ Gabriel García Loygorri, Secretario General del Turismo.
- ◆ Federico Reparaz, Secretario General del Consejo de Administración de la RENFE.
- ◆ Luis López Jamar, Director en España de la Compañía Internacional de Coches-Camas.
- ◆ Juan Abello, Presidente de la Cámara Oficial de Comercio de Madrid.
- ◆ Mariano Nuez Devesa, Subdirector de la Compañía Metropolitana de Madrid.
- ◆ Rafael Mazarrasa, Director de A.T.E.S.A.
- ◆ Mateo Silvela, Ingeniero Jefe del Departamento de Explotación de la RENFE.
- ◆ Manuel J. Maldonado, Ingeniero Jefe de Departamento Agregado a la Dirección de la RENFE.
- ◆ Víctor Bulto, Ingeniero Jefe del Departamento Comercial de la RENFE.
- ◆ Julian Burrull, Jefe del Departamento Económico y Financiero de la RENFE.
- ◆ Carlos de Inza, Jefe del Gabinete de Estudios Generales y Económicos de la RENFE.

#### *General Secretary :*

- ◆ José Pérez Pozuelo, Ingeniero Jefe de Caminos, Dirección General de Ferrocarriles, Tranvías y Transportes por Carretera.

#### *Assistant General Secretary :*

- ◆ Jesús de Lasala, Ingeniero Subjefe de Departamento, Gabinete de Estudios Generales y Económicos de la RENFE.

### C. — REPORTERS ON THE QUESTIONS SUBMITTED TO THE CONGRESS.

- ◆ A.S. Canavezes Jr., Ingénieur à la Division du Matériel et de la Traction de la Compagnie des Chemins de fer portugais.
- ◆ R. Carlier, Ingénieur à la Direction Générale de la Société Nationale des Chemins de fer belges.
- ◆ Dr.-Ing. G. Cividalli, Inspecteur en Chef Supérieur au Service de la Voie et des Constructions des Chemins de fer de l'Etat italien.
- ◆ K.J. Cook, Chief Mechanical and Electrical Engineer, Eastern and North Eastern Regions, British Railways.
- ◆ A. Crespo, Sous-Directeur, Réseau National des Chemins de fer espagnols.
- ◆ B.H. de Fontgalland, Ingénieur Principal à la Direction Générale (Etudes Générales) de la Société Nationale des Chemins de fer français.
- ◆ J. Dorjee, Directeur Général de la S.A. des Messageries Van Gend & Loos, Camionneurs et Transitaires Pays-Bas).
- ◆ Ministerialrat Dipl.-Ing. V. Felder, Finanzieller Direktor der Österreichischen Bundesbahnen.
- ◆ G.F. Fiennes, Line Traffic Manager, Great Northern, British Railways.
- ◆ Dr.-Ing. G.A. Gaebler, Ministerialrat in der Hauptverwaltung der Deutschen Bundesbahn.
- ◆ F. Jackson, Assistant Chief Civil Engineer (Maintenance), South African Railways and Harbours.
- ◆ A. Jacobs (\*), Ingénieur en Chef à la Société Nationale des Chemins de fer belges.

- ◆ W. Keller, Chef de Section du Contrôle des Finances et de la Comptabilité Générale des Chemins de fer fédéraux suisses.

- ◆ S.L. Kumar, Director Research, Railway Board, Ministry of Railways (India).
- ◆ F. Lemmerhold, Hauptverwaltungsrat, Referent für Brückenangelegenheiten in der Hauptverwaltung der Deutschen Bundesbahn.
- ◆ M. Marchand, Ingénieur en Chef à la Direction du Mouvement à la Société Nationale des Chemins de fer français.
- ◆ L. Prieto, Ingénieur en Chef Adjoint du Département de la Voie et des Travaux, Réseau National des Chemins de fer espagnols.
- ◆ Dr.-Ing. E. Stagni, Professeur à l'Institut des Transports de l'Université de Bologne, ancien Inspecteur en Chef au Ministère des Transports (Italie).
- ◆ Sten Ubbe, Chief Stores Manager, Swedish State Railways.
- ◆ M. Viani, Directeur Adjoint du Réseau National des Chemins de fer espagnols.
- ◆ N.C. Vogan, Chief Civil Engineer, New South Wales Government Railways.

### D. — PRINCIPAL SECRETARIES.

- ◆ R. De Clercq, Inspecteur Général à la Société Nationale des Chemins de fer vicinaux (Belgique).
- ◆ A. Jacobs (\*), Ingénieur en Chef du Service de la Voie à la Société Nationale des Chemins de fer belges.
- ◆ A. Marchal (\*), Ingénieur Principal du Service de l'Exploitation à la Société Nationale des Chemins de fer belges.
- ◆ P. Schoonjans (\*), Ingénieur Principal du Service de l'Exploitation à la Société Nationale des Chemins de fer belges.
- ◆ R. Squilbin (\*), Ingénieur Principal du Service du Matériel et des Achats à la Société Nationale des Chemins de fer belges.

### E. — SECTION SECRETARIES.

- ◆ B.T. Beken, Assistant International Traffic Officer, British Transport Commission.
- ◆ A.E. Beresford, Indoor Assistant, British Railways.
- ◆ B. Broca, Inspecteur Divisionnaire au 1<sup>er</sup> Arrondissement V.B., Région Sud-Ouest de la S.N.C.F.
- ◆ J. Cahill, Clerical Officer, Coras Iompair Eireann.
- ◆ V. Canyn, Inspecteur Divisionnaire à la Direction des Etudes Générales de la S.N.C.F.
- ◆ J.R. de Urcola y Ansola, Ingeniero Subjefe del Departamento de Explotación de la RENFE.
- ◆ J.H. Glendinning, District Engineer, Peterborough, British Transport Commission.
- ◆ P. Lance, Ingénieur à la Division du Mouvement de la Région Ouest de la S.N.C.F.
- ◆ J. Lowy Szabo, Ingeniero de la Secretaria General Técnica del Ministerio de Obras Públicas (Espagne).
- ◆ F. Mottay, Inspecteur Divisionnaire, Matériel et Traction, Région du Nord de la S.N.C.F.
- ◆ L. Navarro Gil, Ingeniero de la 2<sup>a</sup> Zona de Material y Tracción de la RENFE (Division Inspectora).
- ◆ R.E.F. Oggier, Assistant Electronic Data Processing Unit, London Transport Executive.
- ◆ F. Oliveros Rives, Ingeniero Jefe en los Servicios de Estadísticas de la RENFE.



- ◆ G. Reder Klingebell, Ingeniero Agregado al Secretariado de la Comisión Local.
- ◆ J. Unal, Ingénieur, Chef de la Subdivision de l'Entretien à la Région de la Méditerranée de la S.N.C.F.

## F. — SECTION SECRETARY IN GENERAL SERVICE.

- ◆ P. Punt, British Railways.

## II. — Delegates appointed by adherent Governments and by affiliated Railway Administrations and Organisations.

### A. — GOVERNMENTS AND THEIR DELEGATES.

#### (Argentina).

##### *Ministère des Transports :*

- ◆ Lopez Abuin, Ministre des Transports.
- ◆ R. Isely, Director de Contralor Técnico.
- ◆ A.L. Besada, Director de Contralor Económico Financiero.
- ◆ J. Celdeiro Ricoy, Jefe Departamento Comercial.
- ◆ I.F. Young, Jefe Investigaciones Económicas.
- ◆ J. Vazquez, Jefe Division Consejo Coordinador.
- Ministère des Travaux Publics :*
- ◆ J.G. Villar, Secrétaire Général.

#### Belgique (Belgium).

##### *Ministère des Communications :*

- ◆ M. Malderez (\*), Secrétaire Général du Ministère des Communications. (Membre de la Commission Permanente.)
- ◆ J. Vrebos, Directeur Général de l'Administration des Transports.
- ◆ P. Nicolas, Ingénieur en Chef, Directeur à l'Administration des Transports.
- ◆ J. Gordts, Conseiller-Chef de Service à l'Administration des Transports.

##### *Ministère du Congo et du Ruanda-Urundi :*

- ◆ L. Brossel, Directeur d'Administration.

#### Bulgarie (Bulgaria).

##### *Ministère des Transports et des Communications :*

- ◆ V. Th. Vlaikov, Conseiller.
- ◆ A.I. Athanassov, Conseiller.

#### Bolivia.

- ◆ L.F. Oropeza, Ministro Consejero de Embajada en Madrid.

#### Danemark (Denmark).

##### *Ministère des Travaux Publics :*

- ◆ P. Christensen, Secrétaire Général au Ministère des Travaux Publics.
- ◆ P. Harboe, Directeur de l'Inspection des Chemins de fer privés.
- ◆ E. Greve Petersen, Conducteur de locomotive.

#### Espagne (Spain).

##### *Ministère des Travaux Publics :*

- ◆ J. Bustamante, Presidente de la Junta de Enlaces Ferroviarios.

- ◆ A. Fernandez de Navarrete y Rada, Inspector General de la 8ª Demarcación (Ferrocarriles).
- ◆ P. Benito Barrachina, Inspector General de la 7ª Demarcación (Ferrocarriles).
- ◆ C. Fesser y Fernandez, Presidente de la Sección de Ferrocarriles del Consejo de Obras Públicas y Secretario General del Consejo Superior de Ferrocarriles y Transportes por Carretera.
- ◆ G. Torres-Quevedo, Jubilado como Vicepresidente del Consejo de Obras Públicas.
- ◆ F. Del Pino y Del Pino, Ingeniero Jefe de la 2ª Jefatura de Estudios y Construcciones de Ferrocarriles.
- ◆ A. Salazar Martinez, Ingeniero Jefe de la 4ª Jefatura de Estudios y Construcciones de Ferrocarriles.
- ◆ L. del Rio y Soler de Cornellá, Ingeniero Jefe de la 5ª Jefatura de Estudios y Construcciones de Ferrocarriles.
- ◆ J. Oquiénena, Ingeniero Director del Ferrocarril de Santander a Bilbao.
- ◆ S. Notario Lodos, Ingeniero Industrial en la División Inspectora de la RENFE.
- ◆ J. Mira Rodriguez, Ayudante Sección Concesiones y Construcciones, Dirección General de Ferrocarriles.
- ◆ F. Nuñez Arenas, Interventor del Estado en la Explotación de Ferrocarriles y Presidente Junta Detasas de Madrid.
- ◆ J. Lowy Szabo (\*), Ingeniero de la Secretaría General Técnica del Ministerio de Obras Públicas (Secrétaire de Section.)

#### Finlande (Finland).

- ◆ W.I. Häkkinen, Councillor at the Ministry of Communications and Public Works.

#### France.

##### *Ministère des Travaux Publics, des Transports et du Tourisme :*

- ◆ E. Dorges (\*), Secrétaire Général Honoraire aux Travaux Publics et aux Transports, Délégué Général aux Affaires Internationales du Ministère des Travaux Publics, des Transports et du Tourisme. (Membre de la Commission Permanente.)
- ◆ A. Doumenc, Directeur Général des Chemins de fer et des Transports.
- ◆ P. Pialoux, Chef du Service des Chemins de fer.
- ◆ P. Julien, Inspecteur Général des Transports.
- ◆ M. Créange, Ingénieur en Chef des Transports.

#### Grande-Bretagne (Great Britain).

##### *Ministry of Transport and Civil Aviation :*

- ◆ Sir Gilmour Jenkins (\*), K.C.B., K.B.E., M.C., Permanent Secretary, Ministry of Transport and Civil Aviation. (Member of the Permanent Commission.)

- ◆ **P. Faulkner**, Deputy Secretary, Ministry of Transport and Civil Aviation.
- ◆ **A. Hallworth**, General Secretary, Associated Society of Locomotive Engineers and Firemen.
- ◆ **Brig. Ch. A. Langley (\*)**, Chief Inspecting Officer of Railways, Ministry of Transport and Civil Aviation. (Member of the Permanent Commission.)

#### Inde (India).

##### *Ministry of Railways (Railway Board) :*

- ◆ **P.C. Mukerjee (\*)**, Chairman, Railway Board, Ministry of Railways, Government of India. (Member of the Permanent Commission.)

#### Italie (Italy).

##### *Ministère des Transports :*

- ◆ **Dr.-Ing. V. Perrone (\*)**, Inspecteur Général Supérieur Honoraire du Ministère des Transports. (Membre de la Commission Permanente.)
- ◆ **Dr.-Ing. E. Stagni (\*)**, Professeur à l'Institut des Transports de l'Université de Bologne, ancien Inspecteur en Chef au Ministère des Transports. (Rapporteur.)
- ◆ **Avv. A. Morganti**, Inspecteur en Chef.
- ◆ **Dr.-Ing. F. Armani**, Inspecteur en Chef.
- ◆ **Dr.-Ing. V. Bongarzone**, Inspecteur en Chef.
- ◆ **Dr.-Ing. P. Fea**, Inspecteur Supérieur.
- ◆ **Dr.-Ing. L. Pratesi**, Inspecteur de première classe.
- ◆ **Dr.-Ing. N. Perrone**, Inspecteur au Ministère des Transports.

#### Luxembourg (Luxemburg).

##### *Commissariat du Gouvernement Luxembourgeois pour les Chemins de fer :*

- ◆ **A. Clemang**, Commissaire du Gouvernement près la Société Nationale des Chemins de fer luxembourgeois.

#### Norvège (Norway).

##### *Ministère des Communications :*

- ◆ **O. Brodahl**, Directeur au Ministère des Communications.
- ◆ **L. Tveten**, Directeur Général Adjoint des Chemins de fer de l'Etat norvégien.

#### Pakistan.

##### *Ministry of Communications (Railway Division) :*

- ◆ **N.A. Qureshy**, Liaison Officer for Pakistan Railways.

#### Pérou (Peru).

- ◆ **E. Lafosse Benedetti**, Second Secrétaire à l'Ambassade du Pérou à Madrid.

#### Pologne (Poland).

- ◆ **Mgr. Ing. Z. Modlinski**, Sous-Secrétaire d'Etat au Ministère des Communications. (Membre de la Commission Permanente.)

#### Portugal.

##### *Ministère des Communications :*

- ◆ **M. Dias Trigo (\*)**, Ingénieur, Directeur des Services d'Exploitation et du Matériel à la Direction des Transports Terrestres. (Membre de la Commission Permanente.)

##### *Ministère d'Outre-Mer :*

- ◆ **C. Manitto Torres**, ancien Ingénieur en Chef des l'Exploitation et Administrateur des Chemins de fer de l'Etat portugais.
- ◆ **J.E. de Mello Vieira**, Inspector Superior de Fomento pelo Ministério do Ultramar.

#### Suède (Sweden).

##### *Ministère des Communications :*

- ◆ **E. Upmark (\*)**, Directeur Général de la Direction Générale des Chemins de fer de l'Etat suédois. (Membre de la Commission Permanente.)
- ◆ **E. Grafström**, Directeur Général de la Direction de l'Energie Electrique de l'Etat.
- ◆ **E. Svensson**, Vice-Président de la Svenska Järnvägsmannaförbundet.
- ◆ **C.S. : son Schmidt**, Ingénieur en Chef, Reviseur-Contrôleur des S.J.

#### Suisse (Switzerland).

##### *Office Fédéral des Transports :*

- ◆ **R. Kunz (\*)**, Directeur de l'Office Fédéral des Transports du Département Fédéral des Postes et des Chemins de fer. (Membre de la Commission Permanente.)
- ◆ **J. Nell**, Chef du Service Technique et d'Exploitation à l'Office Fédéral des Transports du Département Fédéral des Postes et des Chemins de fer.
- ◆ **J. Gerber**, Chef de la Section Voies et Bâtiments à l'Office Fédéral des Transports du Département Fédéral des Postes et des Chemins de fer.
- ◆ **Prof. Dr. H.R. Meyer**, Délégué du Département des Postes et des Chemins de fer pour les Questions Economiques.

#### (Tunisia).

- ◆ **Abbou Tahar**, Fonctionnaire à l'Ambassade de Tunisie à Madrid.

### B. — DELEGATES OF THE AFFILIATED RAILWAY ADMINISTRATIONS.

#### Allemagne Occidentale (Western Germany).

##### *Deutsche Bundesbahn :*

- ◆ **Prof. Dr. jur. H.M. Oeftering (\*)**, Vorsitzender des Vorstandes der Deutschen Bundesbahn. (Membre de la Commission Permanente.)
- ◆ **H. Geitmann (\*)**, Präsident der Deutschen Bundesbahn. (Membre de la Commission Permanente.)
- ◆ **A. Brill (\*)**, Direktor der Hauptverwaltung der Deutschen Bundesbahn. (Membre de la Commission Permanente.)



- ◆ M. Jacobshagen (\*), Direktor der Hauptverwaltung der Deutschen Bundesbahn. (Membre de la Commission Permanente.)
- ◆ E. Kessler, Direktor der Hauptverwaltung der Deutschen Bundesbahn.
- ◆ Prof. Dr. jur. W. Haustein, Präsident des Hauptprüfungsamts für die Deutsche Bundesbahn.
- ◆ W. Rohde, Ministerialdirigent.
- ◆ Dr.-Ing. G.A. Gaebler (\*), Ministerialrat. (Rapporteur.)
- ◆ Fr. Lemmerhold (\*), Ministerialrat. (Rapporteur.)
- ◆ W. Hennig, Ministerialrat.
- ◆ Dr.-Ing. W. Effmert, Ministerialrat.
- ◆ Dr.-Ing. G. Schramm, Ministerialrat.
- ◆ A. Weckmann, Ministerialrat.
- ◆ Dr. jur. K. Wendler, Ministerialrat.
- ◆ Dr. jur. G. Krause, Ministerialrat.
- ◆ Prof. Dr.-Ing. W. Schmitz, Ministerialrat.
- ◆ W. Singelmann, Amtsrat.
- ◆ A. Pauker, Verkehrsagent der Deutschen Bundesbahn.
- ◆ Karenovics, Angestellter.
- ◆ S. Lüderitz, B.B.-Amtsrat.
- ◆ A. Baumann, Schriftleiter der ETR.

#### Argentine (Argentina).

##### *Chemins de fer de l'Etat :*

- ◆ Ing<sup>o</sup> O. Garau, Jefe División Conservación, Departamento Vía y Obras, F.G.G. San Martin.
- ◆ Ing<sup>o</sup> D.A. Feliu Badalo, Jefe Departamento Eléctrico, F.C.D.F. Sarmiento.
- ◆ Ing<sup>o</sup> J. Balino, Jefe Departamento Mecánica F.C.G. Belgrano.
- ◆ Ing<sup>o</sup> R. Sanchez, Jefe División Estadística e Investigaciones Técnico-Económicas E.F.E.A.
- ◆ I.N. Cousau, Ingénieur en Chef, Réseau Ferrocarriles Mitre.
- ◆ Ing<sup>o</sup> Carlos A. Luppi.

#### Autriche (Austria).

##### *Österreichische Bundesbahnen :*

- ◆ Dr. M. Schantl (\*), Generaldirektor. (Membre de la Commission Permanente.)
- ◆ Dipl.-Ing. V. Felder (\*), Finanzieller Direktor. (Rapporteur.)

#### Belgique, Congo Belge et Ruanda-Urundi. (Belgium, Belgian Congo and Ruanda-Urundi).

##### (a) (Belgium).

##### *Société Nationale des Chemins de fer belges :*

- ◆ M. De Vos (\*), Directeur Général. (Président de la Commission Permanente de l'Association.)
- ◆ M. Crem (\*), Directeur du Service de l'Exploitation. (Vice-Président de la Commission Permanente.)
- ◆ P. Nolet de Brauwere van Steeland (\*), Secrétaire Général. (Membre de la Commission Permanente.)
- ◆ P. Lalou, Administrateur, Membre du Comité Permanent.
- ◆ A. Brouckaert (\*), Directeur du Service du Matériel et des Achats. (Membre de la Commission Permanente.)
- ◆ E. Clarembaux (\*), Directeur du Service de la Voie. (Membre de la Commission Permanente.)

- ◆ E. Derijckere (\*), Directeur du Service de l'Electricité et de la Signalisation. (Membre de la Commission Permanente.)
- ◆ R.J.L.O. Carlier (\*), Ingénieur à la Direction Générale. (Rapporteur.)
- ◆ L. Discry, Ingénieur en Chef au Service de l'Exploitation.
- ◆ A. Dehaen, Ingénieur en Chef au Service de la Voie.
- ◆ S. Boulanger, Ingénieur Principal au Service du Matériel et des Achats-Traction Diesel.
- ◆ A. Jacobs (\*), Ingénieur en Chef au Service de la Voie. (Secrétaire Principal et rapporteur.)
- ◆ R.A.E. Squilbin (\*), Ingénieur Principal au Service du Matériel et des Achats. (Secrétaire Principal.)
- ◆ A. Marchal (\*), Ingénieur Principal au Service de l'Exploitation. (Secrétaire Principal.)
- ◆ P. Schoonjans (\*), Ingénieur Principal au Service de l'Exploitation. (Secrétaire Principal.)

##### *Société Nationale des Chemins de fer Vicinaux :*

- ◆ A. André, Président du Conseil d'Administration.
- ◆ R. Hoens (\*), Directeur Général. (Membre de la Commission Permanente.)
- ◆ P. Swinnens, Directeur.
- ◆ R. De Clercq (\*), Inspecteur Général. (Secrétaire Principal.)

##### *Compagnie générale d'Entreprises électriques et industrielles « Electrobél » :*

- ◆ L. Servaye, Directeur à l'Electrobél.

##### *Compagnie belge de Chemins de fer et d'Entreprises :*

- ◆ R.J.L. Saliès, Directeur.

##### b) Belgian Congo and Ruanda-Urundi.

##### *Compagnie du Chemin de fer du Bas-Congo au Katanga :*

- ◆ P. Sorel, Administrateur-Délégué.
- ◆ G. Wenes, Directeur Général en Afrique.
- ◆ Ch. Delelienne, Directeur.
- ◆ F. Hauchamps, Directeur-Adjoint.
- ◆ L. Van Simaëys, Secrétaire Général.
- ◆ E. Limet, Ingénieur en Chef.

##### *Compagnie des Chemins de fer du Congo Supérieur aux Grands Lacs africains :*

M. Duquesne, Ingénieur.

##### *Chemins de fer Vicinaux du Congo :*

- ◆ A. Lienart, Administrateur.
- ◆ J. Theves, Ingénieur.
- ◆ L. Brossel (\*), Inspecteur Royal des Colonies, Délégué de M. le Ministre du Congo Belge et Ruanda-Urundi auprès de la S.C.V.C.

##### *Office d'Exploitation des Transports Coloniaux « OTRACO » :*

- ◆ L. Breuls de Tiecken, Président.
- ◆ E. Voordecker, Administrateur-Gérant.
- ◆ Ch. Richelot, Directeur Général des Services Techniques.

**Danemark (Denmark).***Chemins de fer de l'Etat danois :*

- ◆ P.E.N. Skov (\*), Directeur Général. (Membre de la Commission Permanente.)
- ◆ C.C. Hedegaard Christensen, Directeur du Matériel.
- ◆ L. Buus-Pedersen, Directeur du Personnel.
- ◆ S.C.C. Thorning Christensen, Directeur des Voies et Bâtiments.
- ◆ A. Kristensen, Directeur de Région.
- ◆ N. Sloth, Chef de Section.

*Chemin de fer privé d'Aalborg :*

- ◆ G. Ch. Rendbeck, Président du Conseil.
- ◆ J.A. Larsen, Membre du Conseil.

**Egypte (Egypt).***Egyptian-Republic Railways :*

- ◆ Eng. Mahmoud Abdel Salam.

**Espagne (Spain).***Réseau National des Chemins de fer espagnols (RENFE) :*

- ◆ A. Plana (\*), Sous-Secrétaire aux Travaux Publics et Président du Conseil d'Administration de la RENFE. (Président de la XVII<sup>e</sup> Session et membre de la Commission Permanente.)
- ◆ J.M. Garcia-Lomas (\*), Vice-Président du Conseil d'Administration. (Président du Comité Exécutif de la Commission Locale d'Organisation et membre de la Commission Permanente.)
- ◆ J. Puig Batet (\*), Directeur. (Vice-Président du Comité Exécutif de la Commission Locale Espagnole d'Organisation et Membre de la Commission Permanente.)
- ◆ J. de Aguinaga (\*), Directeur Adjoint. (Membre du Comité Exécutif de la Commission Locale Espagnole d'Organisation et membre de la Commission Permanente.)
- ◆ F. Perez Villamil (\*), Directeur Adjoint. (Membre du Comité Exécutif de la Commission Locale Espagnole d'Organisation et membre de la Commission Permanente.)
- ◆ F. Wais, Directeur Adjoint.
- ◆ A. Crespo (\*), Sous-Directeur. (Rapporteur.)
- ◆ M. Viani (\*), Directeur Adjoint. (Rapporteur.)
- ◆ R. Flobert, Directeur Adjoint.
- ◆ L. de Usera, Consejero, Miembro del Comité Ejecutivo.
- ◆ J.M. Aguirre, Consejero, Miembro del Comité Ejecutivo.
- ◆ J.M. Lapuerta, Administrateur, Membre du Comité Exécutif.
- ◆ E. Calabia, Administrateur, Membre du Comité Exécutif.
- ◆ P. Gonzalez Bueno, Administrateur.
- ◆ C. Botin, Administrateur.
- ◆ R. Rubio, Administrateur.
- ◆ J. Nogues, Sous-Directeur.
- ◆ L. Aza, Sous-Directeur.
- ◆ J. Fernandez-Prida, Sous-Directeur.
- ◆ F. Escario, Chef Adjoint du Département de l'Exploitation.
- ◆ M. Peironcelly, Directeur de la 2<sup>e</sup> Zone.

- ◆ L. Prieto (\*), Ingénieur en Chef Adjoint du Département de la Voie et des Travaux. (Rapporteur.)
- ◆ L. Navarro Gil (\*), Ingeniero de la 2<sup>e</sup> Zona de Material y Traccion de la RENFE (Division Inspector). (Secrétaire de Section.)
- ◆ J.R. de Urcola y Ansola (\*), Ingeniero Subjefe del Departamento de Explotación de la RENFE (Secrétaire de Section.)
- ◆ F. Oliveros Rives (\*), Ingeniero Jefe en los Servicios de Estadísticas de la RENFE (Secrétaire de Section.)
- ◆ G. Reder Klingebell (\*), Ingeniero Agregado al Secretariado de la Comisión Local (Secrétaire de Section.)

*Compagnie générale des Chemins de fer catalans :*

- ◆ G. Turell Moragas, Directeur.
- ◆ P. Aluma Peñalba, Ingénieur, Chef des Services Techniques.

**Finlande (Finland).***Chemins de fer de l'Etat de Finlande :*

- ◆ E.T. Aalto (\*), Directeur Général. (Membre de la Commission Permanente.)
- ◆ A.A. Nikkilä, Directeur du Service Administratif.
- ◆ L.M. Varanki, Directeur du Service de la Voie.
- ◆ M.E. Ivalo, Directeur du Service Matériel et Traction.
- ◆ N.G. Narvala, Inspecteur Principal, Chef de Section.

**France et Union Française.  
(France and French Union).***a) France Métropolitaine. (Metropolitan France).**Société Nationale des Chemins de fer français :*

- ◆ P. Renaud (\*), Vice-Président du Conseil d'Administration. (Membre de la Commission Permanente.)
- ◆ Ph. Dargeou (\*), Directeur Général. (Membre de la Commission Permanente.)
- ◆ F. Hebert, Directeur Général Adjoint. (Membre de la Commission Permanente.)
- ◆ Ch. Boyaux (\*), Directeur Général Honoraire. (Membre de la Commission Permanente.)
- ◆ A. Porchez (\*), Directeur Général Adjoint Honoraire. (Membre de la Commission Permanente.)
- ◆ J.-M. Goursat (\*), Directeur de la Région du Nord. (Vice-Président de la Commission Permanente.)
- ◆ R. Lévi (\*), Directeur des Installations Fixes. (Membre de la Commission Permanente.)
- ◆ Ch. Bourrie, Directeur du Personnel.
- ◆ R. Soulard (\*), Directeur du Mouvement. (Membre de la Commission Permanente.)
- ◆ C. Martin, Directeur du Matériel et de la Traction.
- ◆ L. Delacarte, Directeur Commercial.
- ◆ J. Picard, Chef du Service du Matériel et de la Traction de la Région Ouest.
- ◆ R. Vaubourdoille (\*), Chef Adjoint des Installations Fixes. (Membre de la Commission Permanente.)
- ◆ M. Marchand (\*), Chef de la Division de la Réglementation et de la Sécurité à la Direction du Mouvement. (Rapporteur.)
- ◆ R. Vernier, Chef du Service de l'Exploitation de la Région de l'Ouest.
- ◆ Ch. Feyrabend, Chef de la Division de l'Entretien à la Direction des Installations Fixes.
- ◆ Ch. Tourneur, Chef de la Division des Etudes de Traction à Moteur Thermique.



- ◆ R. Houlez, Chef Adjoint de la Comptabilité Générale et des Finances.
- ◆ M.-Ph. Legrand, Chef du Service de la Voie de la Région Sud-Est.
- ◆ F. Nouvion, Ingénieur en Chef à la Division des Etudes de Traction Electrique de la Direction du Matériel et de la Traction.
- ◆ L. Carpentier, Chef de la Division des Ouvrages d'Art à la Direction des Installations Fixes.
- ◆ L.H. Girardot, Chef de la Division du Service Général au Service de l'Exploitation de la Région du Nord.
- ◆ P. Ravenet, Chef de la Division de l'Entretien du Matériel Moteur à la Direction du Matériel et de la Traction.
- ◆ B.H. de Fontgalland (\*), Ingénieur Principal à la Direction des Etudes Générales. (Rapporteur.)
- ◆ J. Brechot, Ingénieur Principal à la Direction des Etudes Générales.
- ◆ G. de Nodrest, Représentant Général de la S.N.C.F. en Espagne.
- ◆ P. Lance (\*), Ingénieur à la Division du Mouvement de la Région Ouest (Secrétaire de Section).
- ◆ F. Mottay (\*), Inspecteur Divisionnaire, Matériel et Traction, Région du Nord.
- ◆ J. Unal (\*), Ingénieur, Chef de la Subdivision de l'Entretien à la Région de la Méditerranée (Secrétaire de Section).
- ◆ B. Broca (\*), Inspecteur Divisionnaire au 1<sup>er</sup> Arrondissement V.B., Région Sud-Ouest (Secrétaire de Section).
- ◆ V. Canyn (\*), Inspecteur Divisionnaire à la Direction des Etudes Générales (Secrétaire de Section).

#### *Chemins de fer Départementaux :*

- ◆ P.M.F. Zens, Directeur Général.

#### *Société Générale des Chemins de fer Economiques :*

- ◆ M. Poncet, Administrateur.
- ◆ J. Grignon, Directeur Général.
- ◆ G. Guicheteau, Sous-Directeur.
- ◆ Ch. Yvenat, Ingénieur en Chef.

#### *Régie autonome des Transports parisiens (R.A.T.P.) :*

- ◆ M. Langevin, Directeur du Réseau ferré de la R.A.T.P.

#### *Compagnie des Chemins de fer secondaires du Nord-Est :*

- ◆ P. Mariolle, Directeur Général.

#### *Compagnie Générale d'Exploitations Ferroviaires et Routières :*

- ◆ E. Ytasse, Directeur Général.
- ◆ R. Perin, Chef des Services.

b) Autres Territoires de l'Union Française.

#### **Afrique (Africa).**

##### *Chemins de fer algériens :*

- ◆ P. Jusseau, Directeur Général.
- ◆ L. Brunel, Ingénieur en Chef, Voie et Bâtiments.
- ◆ R. Sabattier, Ingénieur en Chef, Exploitation.

- ◆ R. Samie, Ingénieur en Chef, Matériel & Traction.
- ◆ H. Quéstand, Ingénieur Principal, Représentant Général des C.F.A., à Paris.

#### *Chemins de fer de l'Afrique Equatoriale française et Chemins de fer du Cameroun :*

##### *Régie des Chemins de fer du Cameroun :*

- ◆ A. Nicolas, Directeur de la Régie des Chemins de fer du Cameroun.
- ◆ L. Bouisson, Ingénieur, Chemins de fer du Cameroun, Chef du Service Voie et Bâtiments.
- ◆ J. Fadou, Chef du Service Matériel et Traction.

#### *Régie des Chemins de fer de l'Afrique Occidentale française et Chemin de fer du Togo :*

- ◆ F. Surleau, Président du Conseil d'Administration de l'Office Central des Chemins de fer de la F.O.M. (France d'Outre-Mer).
- ◆ J.-Ph. Bosc, Directeur Général de l'Office Central des Chemins de fer de la F.O.M.
- ◆ A. Martin, Directeur Fédéral de la Régie des Chemins de fer de l'A.O.F.
- ◆ E. Harter, Directeur de la Région Abidjan-Niger.
- ◆ P. Protat, Directeur Fédéral Adjoint de la Régie des Chemins de fer de l'A.O.F.
- ◆ P. Josse, Directeur de la Région Dakar-Niger.
- ◆ M. Charlet, Directeur de la Région Benin-Niger.
- ◆ J. Baudier, Chef du Service Commercial de la Régie des Chemins de fer de l'A.O.F.

#### *Compagnie du Chemin de fer Franco-Ethiopien de Djibouti à Addis-Abeba :*

- ◆ M. Rousset de Pina, Directeur Général.

#### *Chemins de fer de Madagascar :*

- ◆ R. Bonnal, Commissaire du Gouvernement auprès de l'Office Central des Chemins de fer de la F.O.M. (France d'Outre-Mer).
- ◆ R. Malacam, Directeur de la Régie des Chemins de fer de Madagascar.
- ◆ M. De Gaillande, Directeur Adjoint de la Régie des Chemins de fer de Madagascar.

#### *Réseau des Chemins de fer de la Méditerranée au Niger :*

- ◆ H. Quéstand (\*), Chargé de Mission à la Direction Générale.

#### **THE COMMONWEALTH.**

(a) The United Kingdom of Great Britain and Northern Ireland and dependent overseas territories.

- ◆ General Sir Brian Hubert Robertson (\*), Bart., G.C.B., G.B.E., K.C.M.G., K.C.V.O., D.S.O., M.C., Chairman of the British Transport Commission. (Member of the Permanent Commission.)

- ◆ Sir John Benstead (\*), C.B.E., Deputy Chairman of the British Transport Commission. (Member of the Permanent Commission.)
- ◆ Sir J. Landale Train (\*), C.B.E., M.C., Member, British Transport Commission. (Member of the Permanent Commission.)
- ◆ J. Ratter (\*), Technical Adviser, British Transport Commission. (Member of the Permanent Commission.)
- ◆ David Blee (\*), C.B.E., General Manager, London Midland Region, British Railways. (Member of the Permanent Commission.)
- ◆ K.W.C. Grand (\*), General Manager, Western Region, British Railways. (Member of the Permanent Commission.)
- ◆ G.F. Fiennes (\*), Line Traffic Manager. (Reporter.)
- ◆ K.J. Cook (\*), Chief Mechanical and Electrical Engineer, Eastern & North Eastern Regions, British Railways. (Reporter.)
- ◆ J.W. Watkins, C.V.O., D.S.O., M.C., Member of the British Transport Commission.
- ◆ J.L. Harrington, Chief International Services Officer. (*Assistant General Secretary of the Session.*)
- ◆ B.W.C. Cooke, Agent, British Railways.
- ◆ A. Dean, Chief Civil Engineer, North Eastern Region, British Railways.
- ◆ J. Gillespie, Chief Railway Accountant, British Transport Commission.
- ◆ G.H. Hinds, Electronics Advisory Officer, British Transport Commission.
- ◆ Ch.F. Klapper, Agent, British Railways.
- ◆ R.A. Smeddle, Chief Mechanical and Electrical Engineer, Western Region, British Railways.
- ◆ W.J.A. Sykes, Chief Mechanical and Electrical Engineer, Southern Region, British Railways.
- ◆ E.W. Arkle, Director of Traffic Services, London Midland Region, British Railways.
- ◆ J.H. Glendinning (\*), District Engineer, Peterborough, British Transport Commission. (Section Secretary.)
- ◆ A.E. Beresford (\*), Indoor Assistant, British Railways (Section Secretary.)
- ◆ B.T. Beken (\*), Assistant International Traffic Officer, British Transport Commission (Section Secretary)
- ◆ P. Punt (\*), British Railways (Section Secretary.)

#### *London Transport Executive :*

- ◆ Sir John Elliot (\*), Chairman. (Member of the Permanent Commission.)
- ◆ B.H. Harbour, Member of the Executive.
- ◆ C.E. Dunton, Chief Civil Engineer.
- ◆ R.E.F. Oggier (\*), Assistant Electronic Data Process Unit. (Section Secretary.)

#### *East African Railways and Harbours :*

- ◆ J.R. Farquharson, General Manager.
- ◆ W.J. Lardner, Stores Superintendent.
- ◆ R.L. Rolph, Assistant Chief Engineer (Admin.).
- ◆ R.H. Whittington, Assistant Chief Operating Superintendent.
- ◆ T.W. Eydes, Works Engineer.
- ◆ I.E. Garfield, District Traffic Superintendent.
- ◆ E.J.M. Hayward, District Traffic Superintendent.
- ◆ N.F. Mostyn, Stores Accountant.
- ◆ N.F. Stevens, Assistant Chief Mechanical Engineer (Workshops).

#### *Nigerian Railway Corporation :*

- ◆ Col. Sir Ralph B. Emerson, Chairman and General Manager.
- ◆ H. McMillan Alexander, Deputy Chief Engineer (Construction).
- ◆ F.A.O. Phillips, Locomotive Works Superintendent.
- ◆ S. Davis, Chief Superintendent.
- ◆ J.C. Egbuna, London Representative.
- ◆ S.K. Hussain, Assistant Works Manager (Carriage) of Mechanical Department.

#### *b) Australie (Australia).*

##### *New South Wales Government Railways :*

- ◆ N.Ch. Vogan (\*), Chief Civil Engineer. (Rapporteur.)

#### *c) Nouvelle-Zélande (New Zealand).*

##### *New Zealand Government Railways :*

- ◆ R.F. Marriott (\*), Advisory Engineer, New Zealand Government Railways. (Member of the Permanent Commission.)

#### *d) Union Sud-Africaine (Union of South Africa).*

##### *South African Railways and Harbours :*

- ◆ D.H.C. Du Plessis, General Manager.
- ◆ F. Jackson (\*), Assistant Chief Civil Engineer (Maintenance). (Reporter.)
- ◆ W.H.W. Maass (\*), Advisory Engineer. (Member of the Permanent Commission.)
- ◆ J.R. Naisby, Commercial Representative.
- ◆ J.C. Piek, Secretary to the General Manager.

#### *e) Federation of Rhodesia and Nyasaland.*

##### *Rhodesia Railways :*

- ◆ A.H. Croxton, Chief Superintendent of Transportation.

##### *Nyasaland Railways, Limited :*

- ◆ W. Codrington, Chairman.
- ◆ J.F.M. Hodgson, Chief Engineer.
- ◆ E.A. Short, Secretary to Nyasaland Railways, Ltd.

#### *f) Etat du Ghana (Ghana State).*

##### *Ghana Railway :*

- ◆ H.F.P. Plumridge, General Manager.

#### *g) Etat de Malaisie (Malaysia).*

##### *Malayan Railway Administration :*

- ◆ E.T. Williams, Assistant General Manager.

#### *Grèce (Greece).*

##### *Chemins de fer de l'Etat Hellénique :*

- ◆ Chr. Canelopoulos, Ingénieur, Directeur Général Adjoint, Directeur de l'Arrondissement d'Athènes.



*Chemin de fer Pirée-Athènes-Péloponèse :*

- ◆ G. Papalexandrou, Directeur Général.
- ◆ N. Economou, Directeur de la Traction et du Matériel.
- ◆ K. Stamelos, Directeur de l'Exploitation.

**Inde (India).***Indian Government Railways (Railway Board of India) :*

- ◆ P.C. Mukerjee (\*), Chairman, Railway Board, Ministry of Railways. (Member of the Permanent Commission.)
- ◆ S.L. Kumar (\*), Director Research, Indian Railway Board. (Reporter.)
- ◆ L.T. Madnani, Director Mechanical Engineering, Indian Railways; now Railway Adviser to High Commissioner for India in London. (Member of the Permanent Commission.)
- ◆ S.K. Kanjilal, Senior Electrical Engineer, Indian Railways.

**Irak.***Iraqi Republican Railways :*

- ◆ S.Z. Tawfik, Director General.
- ◆ R. Hadid, Chief Engineer.

**République d'Irlande (Republic of Ireland).***Córas Iompair Éireann :*

- ◆ Th. Courtney (\*), Member. (Member of the Permanent Commission.)
- ◆ D. Stewart, Traffic Manager.
- ◆ L. Collins, Deputy Chief Engineer (Mechanical).
- ◆ T. Hogan, Director.
- ◆ J. Cahill (\*), Clerical Officer (Section Secretary).

**Italie (Italy).**

- ◆ Dr.-Ing. S. Rissone, Directeur Général. (Membre de la Commission Permanente.)
- ◆ Dr.-Ing. A. Florena (\*), Directeur Général Adjoint. (Membre de la Commission Permanente.)
- ◆ Dr.-Ing. A. Cuttica, (\*), Directeur Général Adjoint et Conseiller d'Administration. (Membre de la Commission Permanente.)
- ◆ Dr.-Ing. P. Giobbe, Directeur de Service. (Membre de la Commission Permanente.)
- ◆ Dr.-Ing. M. Cirillo, Directeur de Service.
- ◆ Dr.-Ing. M. Fanelli, Directeur de Service.
- ◆ Prof. F. Santoro, Directeur de Service.
- ◆ Dr.-Ing. C. Gardini, Directeur de Service.
- ◆ G. Cividalli (\*), Chef de Service Adjoint. (Rapporteur.)
- ◆ Dr. D. Cecchi, Inspecteur en Chef Supérieur.

*Chemins de fer de la Méditerranée :*

- ◆ Dr. R. Cavaliere, Consigliere Delegato.
- ◆ Dr.-Ing. R. Rosati, Direttore Esercizio, Ferrovie Calabro Lucane.
- ◆ Ing. M. Sirignano, Vice Direttore Tecnico.

*Chemins de fer du Nord de Milan :*

- Dr.-Ing. R. Bremond, Directeur de l'Exploitation.
- S.p.A. Torinese Tramvie Intercomunali :*
- ◆ Dott. G. Gastaldetti, Président.
- ◆ Ing. F. Giupponi, Directeur.

**Japon (Japan).***Japanese National Railways :*

- ◆ H. Saito (\*), Director, Foreign Department. (Member of the Permanent Commission.)
- ◆ K. Kubo, Member of the Board of Directors.
- ◆ S. Shimomura, General Manager of the Traffic Bureau, Osaka Municipality.
- ◆ J. Ishida, General Manager, Traffic Bureau, Nagoya Municipality.
- ◆ T. Imaoka, Director, Construction Department.

**Liban. (Lebanon).***Chemin de fer de Damas-Hama et prolongements :*

- ◆ E. Elefteriadès, Directeur Général des Chemins de fer D.H.P. et N.B.T.
- ◆ Ch. Chenut, Administrateur de la Société D.H.P.

**Luxembourg (Luxembourg).***Société Nationale des Chemins de fer luxembourgeois :*

- ◆ J. Metzdorff, Président du Conseil d'Administration.
- ◆ J.-P. Musquar (\*), Directeur. (Membre de la Commission Permanente.)
- ◆ A. Theato, Ingénieur en Chef.

**Maroc (Morocco).***Compagnie du Chemin de fer du Maroc :*

- L. Semeac, Directeur Général.

**Norvège (Norway).***Chemins de fer de l'Etat norvégien :*

- ◆ O. Brodahl (\*), Directeur au Ministère des Communications.
- ◆ L. Tveten, Directeur Général Adjoint.
- ◆ C. Birkeland, Directeur du Matériel Roulant.
- ◆ G. Teige, Directeur de la Région d'Oslo.
- ◆ F. Poppe-Jensen, Directeur de la Région de Bergen.
- ◆ B. Holö, Inspecteur Principal.
- ◆ A. Andresen, Directeur (Compagnie des Wagons-Restaurants des Chemins de fer de l'Etat norvégien).
- ◆ J. Thomseth, Directeur de District.

**Pays-Bas (Netherlands).***S.A. des Chemins de fer Néerlandais :*

- ◆ Ing. F.Q. den Hollander (\*), Président de la Direction Générale. (Membre de la Commission Permanente.)
- ◆ D.J. Wansink, Directeur Général.
- ◆ J.P. Koster, Directeur Général.
- ◆ J. Lohmann, Directeur Général.
- ◆ J.L. Hoorweg, Chef du Service de la Voie et des Travaux.
- ◆ A.W. Olivier, Chef du Service du Mouvement.
- ◆ M.G. de Bruin, Chef du Service des Affaires Economiques.
- ◆ B.C. van Randwijk, Chef du Service des Finances.
- ◆ J.J. Jonker, Chef du Service du Matériel roulant et des Installations Electriques.
- ◆ J. Dorjee (\*), Directeur Général de la N.V. Van Gend & Loos. (Rapporteur.)

**Iles Philippines (The Phillippines ).***Manila Railroad Company :*

- ◆ J.J. Carlos, Chairman, Board of Directors.

**Pologne (Poland).***Chemins de fer polonais :*

- ◆ Prof. Dr.-Ing. W. Wyrzykowski (\*), Vice-Directeur de l'Institut de Sciences et de Recherches du Chemin de fer. (Membre de la Commission Permanente.)
- ◆ Mgr. Ing. T. Neuman, Directeur de l'Administration Centrale de Wagons.
- ◆ Mgr. Ing. K. Sochacki, Directeur de l'Administration Centrale d'Entretien des Chemins de fer.
- ◆ Mgr. F. Matejski, Directeur du Département des Finances au Ministère des Communications.

**Portugal.***a) Continent.**Compagnie des Chemins de fer portugais :*

- ◆ Ing. M. Melo de Oliveira Costa, Administrateur-Délégué.
- ◆ Général F.M.M.M. Vilas-Boas Villar, Administrateur.
- ◆ Ing. A. Branco Cabral, Secrétaire Général.
- ◆ Ing. R. de Espregueira Mendes, Directeur Général.
- ◆ Ing. J.J. dos Santos, Chef de la Division de l'Exploitation.
- ◆ Ing. J.A. de Barros, Chef de la Division de la Voie et Travaux.
- ◆ Ing. J. da Cunha Monteiro, Chef du Service des Ateliers et des Approvisionnements.
- ◆ A.S. Canavezes Jr. (\*), Ingénieur à la Division de Matériel et de la Traction. (Rapporteur.)

*b) Overseas Territories.**Chemins de fer de l'Angola :*

- ◆ V.V. Outeiro, Ingénieur.

*Compagnie du Chemin de fer du Benguela :*

- ◆ Dr. M. Fernandes, Administrateur-Délégué.
- ◆ Col. R.J. Walker, Administrateur.
- ◆ Ing. J.D. Ferreira, Président du Collège des Commissaires.
- ◆ Ing. A. Bandeira, Directeur Général.

*Chemin de fer du Mozambique :*

- ◆ H.A. Brazão de Freitas, Director dos Serviços dos Portos, Caminhos de Ferro e Transportes de Moçambique.
- ◆ F.A. Soares de Seixas, Director de Exploração dos Caminhos de Ferro da Beira (Moçambique).

**Suède (Sweden).***Chemins de fer de l'Etat suédois :*

- ◆ E. Upmark (\*), Directeur Général en Chef. (Membre de la Commission Permanente.)
- ◆ A. Alström, Ingénieur en Chef, Directeur du Service du Matériel Roulant et de la Traction.
- ◆ N. Gudmundsson, Directeur et Chef des Installations Fixes.
- ◆ A. Sjöberg, Directeur des Services Financiers et de Recherches Economiques.
- ◆ S. Reini, Ingénieur en Chef, Directeur adjoint.
- ◆ T. Thorhag, Directeur Adjoint du Service du Mouvement.
- ◆ A. Cardell, Chef de Division du Service du Mouvement.
- ◆ S. Ubbe (\*), Directeur du Service des Approvisionnements et des Magasins. (Rapporteur.)
- ◆ T. Fogelberg, Ingénieur Principal, Chef d'Arrondissement.
- ◆ K.-A. Hurve, Ingénieur en Chef, Chef de Division du Service du Matériel Roulant et de la Traction.
- ◆ A. Jansson, Inspecteur Principal.
- ◆ T. Johannesson, Inspecteur Principal, Chef d'Arrondissement.
- ◆ S. Nyblin, Ingénieur en Chef, Chef de Division du Service du Matériel Roulant et de la Traction.
- ◆ W. Scherman, Chef de Région.
- ◆ N. Ström, Ingénieur Principal, Chef de Dépôt.
- ◆ G. Svenson, Ingénieur Principal, Chef de Section de la Voie.

*Chemin de fer Nora-Bergslagen :*

- ◆ K.O. Hermansson, General Manager.

*Chemin de fer Nordmark-Klarälvens :*

- ◆ V. Hjelm, Traffic Manager.

*Chemin de fer Stockholm-Roslag :*

- ◆ E. Fredrikson, Chief Mechanical Engineer.

*Trafikaktiebolaget Grängesberg-Oxelösunds Järnvägar :*

- ◆ Å. Karlström, Manager.
- ◆ B. Ytterberg, Superintendent of Traffic.



**Suisse (Switzerland).***Chemins de fer fédéraux suisses :*

- ◆ Dr. H. Gschwind (\*), Président de la Direction Générale. (Membre de la Commission Permanente.)
- ◆ O. Wichser, Directeur Général, Chef du Département des Travaux et d'Exploitation.
- ◆ M. Strauss, Secrétaire Général.
- ◆ W. Tribelhorn, Chef Principal de l'Exploitation.
- ◆ M. Portmann, Ingénieur en Chef des Travaux.
- ◆ F. Gerber, Ingénieur en Chef de la Traction et des Ateliers.
- ◆ F. Thomann, Chef de la Division des Finances.
- ◆ W. Keller (\*), Chef de Section au Service de la Compabilité Générale et du Contrôle des Finances. (Rapporteur.)

*Chemin de fer des Alpes bernoises (Berne-Loetschberg-simplon) :*

- ◆ L. von Fellenberg, Ingénieur en Chef.

*Chemin de fer Rhétique :*

- ◆ G. Darms, Président.
- ◆ P. Buchli, Directeur.

*Chemins de fer fribourgeois (G.F.M.) :*

- ◆ Dr. G. Dreyer, Directeur G.F.M.
- Chemin de fer Emmental-Burgdorf-Thun :*
- ◆ C. Mohr, Directeur.

**Syrie (Syria).***Chemins de fer syriens :*

- ◆ R. Jehamy, Directeur Adjoint, Chef du Service du Mouvement et du Trafic.
- ◆ W. Keyali, Chef du Service de la Voie et des Bâtiments.

**Tunisie (Tunisia).***Société Nationale des Chemins de fer tunisiens :*

- ◆ M. Ghedamsi, Ingénieur.
- ◆ H. Tounsi, Inspecteur.

*Chemin de fer de Gafsa :*

- ◆ Y. Segretain, Directeur.
- ◆ W. Floret, Ingénieur, Chef du Service du Matériel de la Traction.

**Union des Républiques Socialistes Sociétiques  
(Union of Soviet Socialist Republics).***U.S.S.R. Railway Transport Ministry :*

- ◆ I.A. Ivanov (\*), Chief of the All-Union Scientific Research Railway Transport Institute. (Membre de la Commission Permanente.)
- ◆ V. Terechov, Deputy Chief of the U.S.S.R. Railway Transport Ministry, Central Department.

- ◆ V. Ivanov, Professor of the Moscow Railway Transport Institute.

- ◆ I. Vasiliev, Senior Engineer of the U.S.S.R. Railway Transport Ministry.

- ◆ E. Smirnov, Section Chief of the All-Union Scientific Research Railway Transport Institute.

- ◆ V. Nikiforovsky, Section Chief of the All-Union Scientific Research Railway Transport Institute.

- ◆ S. Orlov, Division Chief of the U.S.S.R. Railway Transport Ministry.

- ◆ A. Prontarsky, Section Chief of the All-Union Scientific Research Railway Transport Institute.

- ◆ P. Nevejin, Division Chief of the U.S.S.R. Railway Transport Ministry.

- ◆ N. Bestcheva, Bachelor of Technical Science of the All-Union Scientific Research Railway Transport Institute.

- ◆ V. Voevoda, Interpreter of the U.S.S.R. Railway Transport Ministry.

- ◆ T. Lepilova, Interpreter of the U.S.S.R. Railway Transport Ministry.

- ◆ V. Costikov, Post-graduate of the Ist. Moscow Institute of Foreign Languages.

**Yougoslavie (Jugoslavia).***Chemins de fer Yougoslaves :*

- ◆ Ing. J. Švagel (\*), Directeur de l'Institut Ferroviaire de la Direction Générale des Chemins de fer Yougoslaves. (Membre de la Commission Permanente.)

- ◆ Ing. M. Ivanović, Ingénieur en Chef de la Voie et des Travaux.

- ◆ Ing. J. Ivančević, Ingénieur en Chef de la Section Electrotechnique.

**C. — ORGANISATIONS.***Asociación del Congreso Panamericano de Ferrocarriles :*

- ◆ E.M. Huergo, Président de la « Asociación del Congreso Panamericano de Ferrocarriles » (Buenos Aires).

- ◆ J. Nuñez Brian, Secrétaire Général de la « Asociación del Congreso Panamericano de Ferrocarriles ».

- ◆ D.A. Ardigo, Président de la Commission Nationale d'Argentine.

- ◆ E.J. Wilson, Railcar Manager.

*Compagnie Auxiliaire Internationale de Chemins de fer :*

- ◆ M. Ch. L. Caspers, Président, Administrateur-Délégué.

- ◆ J. V.A.L. Stoclet, Vice-Président, Administrateur-Délégué.

*Compagnie Internationale des Wagons-Lits et des Grands Express Européens :*

- ◆ R. Margot-Noblemaire, Administrateur-Directeur Général.
- ◆ A. Widhoff, Directeur Général Adjoint.
- ◆ P. Mareschal, Directeur de l'Exploitation Générale.
- ◆ A. Pillepich, Directeur des Services Techniques.

*Deutsche Schlafwagen- und Speisewagen-Gesellschaft :*

- Dr. Ing. E. Leicher, Geschäftsführer.
- ◆ H. Hofmann, Handlungsbevollmächtigter.
- ◆ W. Busch, Mitglied des D.S.G.-Aufsichtsrats.

*Federazione Nazionale Imprese Trasporti :*

- ◆ S. Pansini, V. Président de la FENIT, Conseiller-Délégué de la Soc. An. Siciliana Trasporti.
- ◆ M. Paribeni, Ingénieur à la FENIT.

*Office Central des Transports Internationaux par Chemins de fer :*

- ◆ Dr. R. Cottier (\*), Directeur. (Membre de la Commission Permanente.)

*Union Internationale des Chemins de fer (U.I.C.) :*

- ◆ J. Tuja (\*), Secrétaire Général de l'U.I.C. (Membre de la Commission Permanente.)

- ◆ P.A. Rousseau, Chef des Services Exécutifs.
- ◆ A. Pagliano, Conseiller Technique Supérieur.
- ◆ J. Klaren, Conseiller Technique Supérieur (O.R.E.).
- ◆ R. Deutsch, Conseiller Technique (O.R.E.).
- ◆ H. Ebeling, Conseiller Technique (O.R.E.).

*Union des Chemins de fer privés Suédois (Svenska Järnvägsföreningen) :*

- ◆ L. Granfeldt, Président.
- ◆ G. Laurell, Directeur Malmö-Limhamns Järnväg.

*Union d'Entreprises suisses de Transport :*

- ◆ Dr. rer. pol. H. Born (\*), Directeur de l'Union d'Entreprises suisses de Transport. (Membre de la Commission Permanente.)
- ◆ Dr. O. Zuber, Direktor der Schweizerischen Südostbahn.

*Union des Voies Ferrées :*

- ◆ A.J.P. Petithory, Délégué.

\* \* \*

*Invited :*

- ◆ A.J.M.A. Jacobs, Secrétaire Général de l'Union Internationale des Transports Publics.



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864	Hussain, S.K. . . . .	Nigerian Railway Corporation. . . . .	II
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190	Inza, Carlos de . . . . .	Comité Exécutif de la Commission Locale Espagnole d'Organisation . . . . .	IV
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935	Ivančević, J. (Ing.) . . . . .	Chemins de fer Yougoslaves . . . . .	II
25	Ivanov, I.A. . . . .	Permanent Commission of the Association and U.S.S.R. Railway Transport Ministry . . . . .	I, V
882	Ivanov, V. . . . .	U.S.S.R. Railway Transport Ministry . . . . .	II
934	Ivanović, M. (Ing.) . . . . .	Chemins de fer Yougoslaves . . . . .	I, V
275	Jackson, F. . . . .	South African Railways and Harbours . . . . .	I, III, V
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52	Jacobshagen, M. . . . .	Commission Permanente de l'Association et Deutsche Bundesbahn . . . . .	III, IV, V
254	Jacops, A. . . . .	Secrétariat de l'Association Internationale du Congrès des Chemins de fer . . . . .	I

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1006	Jehamy, R. . . . .	Chemins de fer Syriens . . . . .	III, IV, V
6	Jenkins (Sir Gilmour) . . . . .	Permanent Commission of the Association and Ministry of Transport and Civil Aviation (Great-Britain) . . . . .	I, III, IV
953	Johannesson, T. . . . .	Chemins de fer de l'Etat Suédois . . . . .	III
924	Jonker, J.J. . . . .	Chemins de fer Néerlandais . . . . .	II, III
870	Josse, P. . . . .	Régie des Chemins de fer de l'Afrique Occidentale Française . . . . .	I, III, V
503	Julien, P. . . . .	Ministère des Travaux Publics, des Transports et du Tourisme (France) . . . . .	I, II, IV
779	Jusseau, P. . . . .	Chemins de fer Algériens . . . . .	I, II, III, IV
1004	Kanjilal, S.K. . . . .	Indian Government Railways . . . . .	II
992	Karenovics . . . . .	Deutsche Bundesbahn . . . . .	II
728	Karlström, A. . . . .	Trafikaktiebolaget Grängesberg-Oxelösunds Järnvägar (Suède) . . . . .	II
251	Keller, W. . . . .	Chemins de fer Fédéraux Suisses . . . . .	IV
902	Kessler, E. . . . .	Deutsche Bundesbahn . . . . .	I, III, V
1007	Keyali, W. . . . .	Chemins de fer Syriens . . . . .	I, V
808	Clapper, Ch.F. . . . .	British Railways . . . . .	III
784	Klaren, J. . . . .	Union Internationale des Chemins de fer. . . . .	I, V
792	Koster, J.P. . . . .	Chemins de fer Néerlandais . . . . .	II, III
172	Krahe, A. . . . .	Commission Locale Espagnole d'Organisation ( <i>Vice-Président du Comité Exécutif</i> ). . . . .	I to V
910	Krause, G. (Dr. jur.) . . . . .	Deutsche Bundesbahn . . . . .	IV
772	Kristensen, A. . . . .	Chemins de fer de l'Etat Danois . . . . .	III
964	Kubo, Kameo . . . . .	Japanese National Railways . . . . .	IV
269	Kumar, S.L. . . . .	Indian Government Railways . . . . .	I, III, V
58	Kunz, R. . . . .	Commission Permanente de l'Association et Office Fédéral des Transports (Suisse) . . . . .	I, IV, V
60	Laloni, N. (Dr.) . . . . .	Commission Permanente de l'Association. . . . .	III, V
1000	Lalou, P. . . . .	Société Nationale des Chemins de fer Belges . . . . .	I, II, III
20	Lamalle, U. . . . .	Commission Permanente de l'Association. . . . .	I to V
156	Lamana, M. . . . .	Commission Locale Espagnole d'Organisation . . . . .	I to V
311	Lance, P. . . . .	Société Nationale des Chemins de fer Français . . . . .	III
713	Langevin, M. . . . .	Régie Autonome des Transports Parisiens (France) . . . . .	II, III
17	Langley, (Brigadier Ch. A.) . . . . .	Permanent Commission of the Association and Ministry of Transport and Civil Aviation (Great Britain) . . . . .	I, II, III
816	Lapuerta, J.M. . . . .	Réseau National des Chemins de fer Espagnols . . . . .	.....
851	Lardner, W.J. . . . .	East African Railways and Harbours . . . . .	III, IV
719	Larsen, J.A. . . . .	Chemin de fer privé d'Aalborg (Danemark) . . . . .	I
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845	Legrand, M.-Ph. . . . .	Société Nationale des Chemins de fer Français . . . . .	I
264	Lemmerhold, Fr. . . . .	Deutsche Bundesbahn . . . . .	I, V
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919	Liénart, A. . . . .	Société des Chemins de fer Vicinaux du Congo . . . . .	I, III, IV, V
736	Limet, E. . . . .	Compagnie du Chemin de fer du Bas-Congo au Katanga . . . . .	II, V
155	de Linos Lage, J. . . . .	Commission Locale Espagnole d'Organisation . . . . .	IV
923	Lohmann, J. . . . .	Chemins de fer Néerlandais . . . . .	I, III, V
561	Lopez Abvin. . . . .	Ministère des Transports (Argentine) . . . . .	.....
174	Lopez Jamar, L. . . . .	Comité Exécutif de la Commission Locale Espagnole d'Organisation . . . . .	IV
188	Lorenzo Ochando, G. . . . .	Commission Locale Espagnole d'Organisation . . . . .	I, IV, V
151	Lorenzo Ochando, P. . . . .	Commission Permanente de l'Association et Commission Locale Espagnole d'Organisation ( <i>Vice-Président</i> ) . . . . .	I to V
301	Lowy Szabo, J. . . . .	Ministère des Travaux Publics (Espagne) . . . . .	I
1009	Lüderitz, G. . . . .	Deutsche Bundesbahn . . . . .	IV, V
1021	Luppi, C.A. (Ing.) . . . . .	Chemins de fer de l'Etat (Argentine) . . . . .	.....
49	Maass, W.H.W. . . . .	Permanent Commission of the Association and South African Railways and Harbours . . . . .	II, V
1003	Madnani, L.T. . . . .	Commission Permanente de l'Association et Indian Government Railways . . . . .	II
159	Mahou, A. . . . .	Commission Locale Espagnole d'Organisation . . . . .	.....
875	Malacam, R. . . . .	Chemins de fer de Madagascar . . . . .	I, III, IV, V
53	Malderez, M. . . . .	Commission Permanente de l'Association et Ministère des Communications (Belgique) . . . . .	II, III, V
183	Maldonado, M.J. . . . .	Comité Exécutif de la Commission Locale Espagnole d'Organisation . . . . .	II
541	Manitto Torres, C. . . . .	Ministère d'Outre-Mer (Portugal) . . . . .	I, II, III
256	Marchal, A. . . . .	Association Internationale du Congrès des Chemins de fer et Société Nationale des Chemins de fer Belges . . . . .	III
274	Marchand, M. . . . .	Société Nationale des Chemins de fer Français . . . . .	III
740	Mareschal, P. . . . .	Compagnie Internationale des Wagons-Lits et des Grands Express Européens . . . . .	III
738	Margot-Noblemaire, R. . . . .	Compagnie Internationale des Wagons-Lits et des Grands Express Européens . . . . .	III, IV
59	Marin, F. (Dr. Ing.) . . . . .	Commission Permanente de l'Association. . . . .	II, III, IV, V
737	Mariolle, P. . . . .	Compagnie des Chemins de fer Secondaires du Nord-Est (France) . . . . .	II, V
61	Marriott, R.F. . . . .	Permanent Commission of the Association and New Zealand Government Railways . . . . .	I, II
867	Martin, A. . . . .	Régie des Chemins de fer de l'Afrique Occidentale française . . . . .	IV, V
837	Martin, C. . . . .	Société Nationale des Chemins de fer Français . . . . .	II



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930	Matejski, F. . . . .	Chemins de fer Polonais . . . . .	IV, V
178	Mazarrasa, R. . . . .	Comité Exécutif de la Commission Locale Espagnole d'Organisation . . . . .	I
940	Melo de Oliveira Costa, M. (Ing.) . . . . .	Compagnie des Chemins de fer Portugais . . . . .	III, IV
756	Metzdorff, J. . . . .	Société Nationale des Chemins de fer Luxembourgeois . . . . .	V
523	Meyer, H.R. (Prof. Dr.) . . . . .	Office Fédéral des Transports (Suisse) . . . . .	III, IV, V
534	Mira Rodriguez, J. . . . .	Ministère des Travaux Publics (Espagne) . . . . .	III, IV, V
946	da Cunha Monteiro, J. (Ing.) . . . . .	Compagnie des Chemins de fer Portugais . . . . .	II, V
180	Moreno, A. . . . .	Comité Exécutif de la Commission Locale Espagnole d'Organisation . . . . .	II, III, IV
536	Morganti, A. . . . .	Ministère des Transports (Italie) . . . . .	IV
880	Mohr, C. . . . .	Chemin de fer Emmental-Burgdorf-Thun (Suisse) . . . . .	I, V
187	Mortes, V. . . . .	Commission Locale Espagnole d'Organisation . . . . .	I, III, IV
857	Mostyn, N.F. . . . .	East African Railways and Harbours . . . . .	IV
310	Mottay, F. . . . .	Société Nationale des Chemins de fer Français . . . . .	II
65	Mukerjee, P.C. . . . .	Permanent Commission of the Association and Ministry of Railways (Railway Board), Government of India . . . . .	II, V
28	Musquar, J.-P. . . . .	Commission Permanente de l'Association et Société Nationale des Chemins de fer Luxembourgeois . . . . .	II, III
899	Naisby, J.R. . . . .	South African Railways and Harbours . . . . .	III, IV, V
863	Narvala, N.G. . . . .	Chemins de fer de l'Etat de Finlande . . . . .	III, IV, V
302	Navarro Gil, L. . . . .	Réseau National des Chemins de fer Espagnols . . . . .	II
521	Nell, J. . . . .	Office Fédéral des Transports (Suisse) . . . . .	II, III
928	Neuman, T. (Mgr. Ing.) . . . . .	Chemins de fer Polonais . . . . .	II, V
888	Nevejin, P. . . . .	U.S.S.R. Railway Transport Ministry . . . . .	II, III
873	Nicolas, A. . . . .	Régie des Chemins de fer du Cameroun . . . . .	I, II, IV, V
526	Nicolas, P. . . . .	Ministère des Communications (Belgique) . . . . .	I, II, V
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822	Noguès, J. . . . .	Réseau National des Chemins de fer Espagnols . . . . .	III, IV
26	Nolet de Brauwere van Steeland, P. . . . .	Commission Permanente de l'Association et Société Nationale des Chemins de fer Belges . . . . .	IV
533	Notario Lodos, S. . . . .	Ministère des Travaux Publics (Espagne) . . . . .	II, III
846	Nouvion, F. . . . .	Société Nationale des Chemins de fer Français . . . . .	II
177	Nuez Devesa, M. . . . .	Comité Exécutif de la Commission Locale Espagnole d'Organisation . . . . .	I, III, IV, V
535	Nuñez Arenas, F. . . . .	Ministère des Travaux Publics (Espagne) . . . . .	III, IV, V
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21	Olivier, G. . . . .	Commission Permanente de l'Association. Ministère des Travaux Publics (Espagne) .	I, V I, IV, V
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878	Outeiro, V.V. . . . .	Union Internationale des Chemins de fer Federazione Nazionale Imprese Trasporti (Italie) . . . . .	II, IV, V II, IV, V
702	Pagliano, A. . . . .	Chemin de fer Pirée-Athènes-Péloponèse (Grèce). . . . .	IV, V
965	Pansini, S. . . . .	Federazione Nazionale Imprese Trasporti (Italie) . . . . .	II, III, V
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966	Paribeni, M. . . . .	Deutsche Bundesbahn . . . . .	III, IV
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962	Paukner, A. . . . .	Commission Locale Espagnole d'Organisa- tion . . . . .	I, IV, V
826	Peironcelly, M. . . . .	Comité Exécutif de la Commission Locale Espagnole d'Organisation ( <i>Secrétaire Géné- ral</i> ) . . . . .	I, IV, V V
185	Peñaranda, J.M. . . . .	Compagnie Générale d'Exploitations Ferro- viaires et Routières (France) . . . . .	I, II, III V
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278	Perrone, N. (Dr. Ing.) . . .	Ministère des Travaux Publics (Danemark) Union des Voies Ferrées (France) . . . .	II, IV, V II
27	Perrone, V. (Dr. Ing.) . . .	Nigerian Railway Corporation . . . . .	II, IV, V
512	Petersen, E.G. . . . .	Ministère des Travaux Publics, des Trans- ports et du Tourisme (France) . . . . .	II, IV, V
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839	Picard, J. . . . .	Commission Permanente de l'Association, Réseau National des Chemins de fer Espagnols et Commission Locale Espagnole d'Organisation, <i>Président de la XVII<sup>e</sup> Ses- sion</i> . . . . .	I, II, III, IV IV, V
900	Piek, J.C. . . . .	Ghana Railway . . . . .	
741	Pillepich, A. . . . .		
7	Plana, A. . . . .		
921	Plumridge, H.F.P. . . . .		

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832	Poppe-Jensen, F. . . . .	Chemins de fer de l'Etat Norvégien . . . .	III
44	Porchez, A. . . . .	Commission Permanente de l'Association et Société Nationale des Chemins de fer Français . . . . .	I, II
706	Portmann, M. . . . .	Chemins de fer Fédéraux Suisses . . . . .	I
540	Pratesi, L. (Dr. Ing.) . . . .	Ministère des Transports (Italie) . . . .	V
272	Prieto, L. . . . .	Réseau National des Chemins de fer Espagnols . . . . .	V
887	Prontarsky, A. . . . .	U.S.S.R. Railway Transport Ministry . .	II, III
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179	Puig Batet, J. . . . .	Commission Permanente de l'Association, Commission Locale Espagnole d'Orga- nisation ( <i>Vice-Président du Comité Exécutif</i> ) et Réseau National des Chemins de fer Espagnols . . . . .	I to V
326	Punt, P. . . . .	British Railways . . . . .	.....
753	Quérand, H. . . . .	Réseau des Chemins de fer de la Méditer- ranée au Niger et Chemins de fer Algériens	I, II, III, IV
258	Ratter, J. . . . .	Permanent Commission of the Association and British Transport Commission . . .	II
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305	Reder Klingebell, G. . . . .	Réseau National des Chemins de fer Espagnols . . . . .	V
955	Reini, S. . . . .	Chemins de fer de l'Etat Suédois . . . . .	I
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722	Richelot, Ch. . . . .	Office d'Exploitation des Transports Colo- niaux « Otraco » . . . . .	I, II, V
531	del Rio y Soler de Cornellá, L.	Ministère des Travaux Publics (Espagne) .	I
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157	Roa, C. . . . .	Commission Locale Espagnole d'Organisa- tion . . . . .	IV, V
34	Robertson (General Sir Brian H.) . . .	Permanent Commission of the Association and British Transport Commission . . .	I, II, III, V
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852	Rolph, R.L. . . . .	East African Railways and Harbours . . .	II, III, V
724	Rosati, R. (Dr. Ing.) . . . .	Chemins de fer de la Méditerranée (Italie).	I, III, IV
701	Rousseau, P.A. . . . .	Union Internationale des Chemins de fer .	I, IV
746	Rousset de Pina, M. . . . .	Compagnie du Chemin de fer Franco- Ethiopien de Djibouti à Addis-Abeba . .	I, IV
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1012	Salam, M.A. . . . .	Egyptian Republic Railways . . . . .	.....
530	Salazar Martinez, A. . . . .	Ministère des Travaux Publics (Espagne) . . . . .	I, V
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782	Samie, R. . . . .	Chemins de fer Algériens . . . . .	II, IV
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980	Santoro, F. (Prof.) . . . . .	Chemins de fer de l'Etat Italien . . . . .	III
23	Schantl, M. (Dr.) . . . . .	Commission Permanente de l'Association et Chemins de fer Fédéraux Autrichiens . . . . .	III, IV, V
956	Scherman, W. . . . .	Chemins de fer de l'Etat Suédois . . . . .	III
542	Schmidt, C.S. : son . . . . .	Ministère des Communications (Suède) . . . . .	III, IV
991	Schmitz, W. (Prof. Dr.-Ing.) . . . . .	Deutsche Bundesbahn . . . . .	I, IV, V
257	Schoonjans, P. . . . .	Secrétariat de l'Association Internationale du Congrès des Chemins de fer . . . . .	IV
907	Schramm, G. (Dr.-Ing.) . . . . .	Deutsche Bundesbahn . . . . .	I, V
714	Segretain, Y. . . . .	Chemin de fer de Gafsa (Tunisie) . . . . .	I, IV
742	Servaye, L. . . . .	Compagnie Générale d'Entreprises Electri- ques et Industrielles « Electrobél » (Bel- gique) . . . . .	IV
971	Shimomura, S. . . . .	Japanese National Railways . . . . .	IV
939	Short, E.A. . . . .	Nyasaland Railways, Limited . . . . .	I to V
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911	Singelmann, W. . . . .	Deutsche Bundesbahn . . . . .	IV
725	Sirignano, M. (Ing.) . . . . .	Chemins de fer de la Méditerranée (Italie). . . . .	I, II, V
957	Sjöberg, A. . . . .	Chemins de fer de l'Etat Suédois . . . . .	IV, V
33	Skov, P.E.N. . . . .	Commission Permanente de l'Association et Chemins de fer de l'Etat Danois . . . . .	.....
773	Sloth, N. . . . .	Chemins de fer de l'Etat Danois . . . . .	IV
809	Smeddle, R.A. . . . .	British Railways . . . . .	II
884	Smirnov, E. . . . .	U.S.S.R. Railway Transport Ministry . . . . .	III, IV
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730	Sorel, P. . . . .	Compagnie du Chemin de fer du Bas-Congo au Katanga . . . . .	I, IV
162	Soto Redondo, M. . . . .	Commission Locale Espagnole d'Organisa- tion . . . . .	II
273	Soulard, R. . . . .	Commission Permanente de l'Association et Société Nationale des Chemins de fer Français . . . . .	III
255	Squibbin, R.A.E. . . . .	Secrétariat de l'Association Internationale du Congrès des Chemins de fer . . . . .	II
268	Stagni, E. (Dr. Ing.) . . . . .	Ministère des Transports (Italie) . . . . .	II, V
970	Stamelos, K. . . . .	Chemin de fer Pirée-Athènes-Péloponèse (Grèce). . . . .	III
922	Stevens, N.F. . . . .	East African Railways and Harbours . . . . .	II, III, V
796	Stewart, D. . . . .	Coras Iompair Eireann (Ireland) . . . . .	II, III, IV
751	Stoclet, J.V.A.L. . . . .	Compagnie Auxiliaire Internationale de Chemins de fer . . . . .	V
704	Strauss, M. . . . .	Chemins de fer Fédéraux Suisses . . . . .	IV

Number	NAME	DELEGATED BY	SECTIONS
958	Ström, N. . . . .	Chemins de fer de l'Etat Suédois . . . .	II
865	Surleau, F. . . . .	Régie des Chemins de fer de l'Afrique Occidentale Française et Chemin de fer du Togo . . . . .	I, III, V
56	Švagel, J. (Ing.) . . . . .	Commission Permanente de l'Association et Chemins de fer Yougoslaves . . . . .	II, V
959	Svenson, G. . . . .	Chemins de fer de l'Etat Suédois . . . .	I, V
520	Svensson, E. . . . .	Ministère des Communications (Suède) . .	II
759	Swinnens, P. . . . .	Société Nationale des Chemins de fer Vicinaux (Belgique) . . . . .	V
810	Sykes, W.J.A. . . . .	British Railways . . . . .	II
994	Tahar, A. . . . .	Gouvernement Tunisien. . . . .	I, II
1013	Tawfik, S.Z. . . . .	Iraqi Republican Railways . . . . .	II, IV
831	Teige, G. . . . .	Chemins de fer de l'Etat Norvégien . . . .	V
881	Terechov, V. . . . .	U.S.S.R. Railway Transport Ministry . . .	II
757	Theato, A. . . . .	Société Nationale des Chemins de fer Luxembourgeois. . . . .	IV
708	Thomann, F. . . . .	Chemins de fer Fédéraux Suisses . . . . .	IV
829	Thomseth, J. . . . .	Chemins de fer de l'Etat Norvégien . . . .	I
960	Thorhag, T. . . . .	Chemins de fer de l'Etat Suédois . . . . .	III
771	Thorning Christensen, S.C.C.	Chemins de fer de l'Etat Danois . . . . .	I, III, V
528	Torres-Quevedo, G. . . . .	Ministère des Travaux Publics (Espagne). .	I
843	Tourneur, Ch. . . . .	Société Nationale des Chemins de fer Français . . . . .	II
40	Train (Sir J. Landale). . . . .	Permanent Commission of the Association and British Transport Commission . . . .	I, II, III
705	Tribelhorn, W. . . . .	Chemins de fer Fédéraux suisses . . . . .	III
11	Tuja, J. . . . .	Commission Permanente de l'Association et Union Internationale des Chemins de fer.	III, IV, V
726	Turell Moragas, G. . . . .	Compagnie Générale des Chemins de fer Catalans (Espagne) . . . . .	I, IV
828	Tveten, L. . . . .	Chemins de fer de l'Etat Norvégien . . . .	IV
262	Ubbe, S. . . . .	Chemins de fer de l'Etat Suédois . . . . .	IV
312	Unal, J. . . . .	Société Nationale des Chemins de fer Français . . . . .	I
54	Upmark, E. . . . .	Commission Permanente de l'Association et Chemins de fer de l'Etat Suédois . . . .	IV, V
303	Urcola y Ansola, J.R. de . . . .	Réseau National des Chemins de fer Espagnols . . . . .	III
154	Urzaiz, M., Duque de Luna	Commission Locale Espagnole d'Organisa- tion . . . . .	.....
814	de Usera, L. . . . .	Réseau National des Chemins de fer Espagnols . . . . .	IV, V
167	Valenciano, F. . . . .	Commission Locale Espagnole d'Organisa- tion . . . . .	II, III, V
794	van Randwijk, B.C. . . . .	Chemins de fer Néerlandais . . . . .	IV
735	Van Simaey, L. . . . .	Compagnie du Chemin de fer du Bas-Congo au Katanga . . . . .	I, IV
861	Varanki, L.M. . . . .	Chemins de fer de l'Etat de Finlande . . . .	I, V
883	Vasiliev, I. . . . .	U.S.S.R. Railway Transport Ministry . . .	III

Number	NAME	DELEGATED BY	SECTIONS
840	Vaubourdolle, R. . . . .	Commission Permanente de l'Association et Société Nationale des Chemins de fer Français . . . . .	I, III, V
550	Vasquez, J. . . . .	Ministère des Transports (Argentine) . . . . .	I, V
841	Vernier, R. . . . .	Société Nationale des Chemins de fer Français . . . . .	III
270	Viani, M. . . . .	Réseau National des Chemins de fer Espagnols . . . . .	II
941	Vilas-Boas Villar (General Federico M.M.M.) . . . . .	Compagnie des Chemins de fer Portugais. Commission Permanente de l'Association, Comité Exécutif de la Commission Locale Espagnole d'Organisation et Réseau National des Chemins de fer Espagnols . . . . .	II, IV
9	P.-Villamil, F. . . . .	Ministère des Travaux Publics (Argentine). Ministère des Transports et des Communications (Bulgarie) . . . . .	I V
563	Villar, J.G. . . . .	U.S.S.R. Railway Transport Ministry. . . . .	.....
551	Vlaikov, V.Th. . . . .	New South Wales Government Railways (Australia) . . . . .	.....
890	Voevoda, V. . . . .	Chemin de fer des Alpes bernoises (Bern-Loetschberg-Simplon) . . . . .	I, V
277	Vogan, N.C. . . . .	Office d'Exploitation des Transports Coloniaux « Otraco » . . . . .	I, V
755	von Fellenberg, L. . . . .	Ministère des Communications (Belgique). Réseau National des Chemins de fer Espagnols . . . . .	III, IV II, III, V
721	Voordecker, E. . . . .	Compagnie du Chemin de fer du Benguela Chemins de fer Néerlandais . . . . .	III, IV I, II, V
515	Vrebos, J. . . . .	British Transport Commission . . . . .	III, IV I to V
821	Wais, F. . . . .	Deutsche Bundesbahn . . . . .	III
915	Walker, Col. R.J. . . . .	Deutsche Bundesbahn . . . . .	III
789	Wansink, D.J. . . . .	Compagnie du Chemin de fer du Bas-Congo au Katanga . . . . .	III, V
802	Watkins, J.W. . . . .	East African Railways and Harbours . . . . .	III, V
908	Weckmann, A. . . . .	Chemins de fer Fédéraux Suisses . . . . .	I, II, III
909	Wendler, K. (Dr. jur.) . . . . .	Compagnie Internationale des Wagons-Lits et des Grands Express Européens . . . . .	III, IV
732	Wenes, G. . . . .	Malayan Railway Administration . . . . .	I, IV, V
853	Whittington, R.H. . . . .	Asociación del Congreso Panamericano de Ferrocarriles . . . . .	II
703	Wichser, O. . . . .	Commission Permanente de l'Association et Chemins de fer Polonais . . . . .	III, IV
739	Widhoff, A. . . . .	Ministère des Transports (Argentine) . . . . .	III, IV
926	Williams, E.T. . . . .	Compagnie Générale d'Exploitations Ferroviaires et Routières (France) . . . . .	IV, V
367	Wilson, E.J. . . . .	Trafikaktiebolaget Grängesberg-Oxelösunds Järnvägar (Suède) . . . . .	III
55	Wyrzykowski, W. (Prof. Dr. Ing.) . . . . .	Société Générale des Chemins de fer Economiques (France) . . . . .	II, IV, V
549	Young, I.F. . . . .	Chemins de fer Départementaux (France). Union d'Entreprises Suisses de Transport . . . . .	III, V .....
989	Ytasse, E. . . . .		
729	Ytterberg, B. . . . .		
894	Yvenat, Ch. . . . .		
743	Zens, P.M.F. . . . .		
961	Zuber, O. (Dr.) . . . . .		



# OPENING CEREMONY OF THE XVIIth SESSION

September 29, 1958, at 5 p.m.

The inaugural ceremony of the XVIIth Session took place in the Main Hall of the « DELEGACIÓN NACIONAL DE SINDICATOS » at Madrid, where large conference rooms had been placed at the disposal of the organisers of the Congress.

The hall was decorated with the flags of all participating nations.

Over 500 delegates and a great number of ladies attended this ceremony.

His Excellency Sr. Don Jorge VIGÓN, Minister of Public Works of Spain, Mr. DE VOS, General Manager of the Belgian National Railways and President of the International Railway Congress Association, and Sr. D. Agustín PLANA SANCHO, Under-Secretary of State to the Ministry of Public Works, President of the Administrative Board of the RENFE and President of the Local Organizing Commission were on the centre dais.

They were supported by :

Sr. SANCHEZ ARJONA, Secretario General de la Organización Sindical;

Ilmo. Sr. D. A. JIMENEZ MILLAS, Vicesecretario General del Movimiento (Spain);

Excmo, Señor Don J. M. GARCIA-LOMAS y COSSIO, Vicepresidente del Consejo de Administración de la RENFE (Spain), Vice-President of the Local Organising Commission;

Ilmo. Señor Don P. LORENZO OCHANDO, Director General de Ferrocarriles, Tranvías y Transportes por Carretera (Spain), Vice-President of the Local Organising Commission; Señor Don J. PEREZ POZUELO,

Ingeniero de Caminos, Dirección General de Ferrocarriles, Tranvías y Transportes por Carretera (Spain), General Secretary of the Executive Committee of the Local Organising Commission;

Mr. P. GHILAIN, General Secretary of the Permanent Commission of the International Railway Congress Association.

In the second Presidency were :

Messrs. J. M. GOURSAT, Directeur de la Région du Nord de la Société Nationale des Chemins de fer français, Vice-President of the Permanent Commission of the Association; Sir Gilmour JENKINS, Permanent Secretary to the Ministry of Transport and Civil Aviation (Great Britain), Member of the Executive Committee of the Permanent Commission of the Association;

E. DORGES, Secrétaire Général Honoraire aux Travaux Publics et aux Transports, Délégué Général aux Affaires Internationales du Ministère des Travaux Publics, des Transports et du Tourisme (France), Member of the Executive Committee of the Permanent Commission of the Association;

M. CREM, Directeur du Service de l'Exploitation de la Société Nationale des Chemins de fer belges, Vice-President of the Permanent Commission of the Association;

Sir John BENSTEAD, Deputy Chairman of the British Transport Commission (Great Britain), Member of the Executive Committee of the Permanent Commission of the Association;

Sr. D. J. PUIG BATET, Director of the RENFE.

Numerous members of the Permanent Commission were also on the platform.

**His Excellency Sr. Don J. VIGÓN, Minister of Public Works and Vice-President of Honour of the Spanish Local Organising Committee welcomed the delegates by saying :**

« Excellencies, Ladies and Gentlemen,

« On the 21st May, 1954, whilst the International Railway Congress Association was holding its Sixteenth Session in London, the Spanish Government agreed to invite the Association to hold the next Session of the Congress in Madrid; the offer was transmitted through the good offices of the Belgian Government and was accepted with pleasure.

« That is why I must to-day, in the name of the Spanish Government, express my thanks for this acceptance, as a result of which many amongst you will remember those days in May, 1930 when the Eleventh Session of the Congress was also held in Madrid.

« It might seem that the Association was to-day making a new start on the occasion of this Congress which is being attended by distinguished representatives of the Governments and Administrations and amongst whom are most important personalities having the highest scientific and economic knowledge.

« However, the life of the Association is not based on intermittent biological processes. It has a life without any break in continuity, vigour and strength which is embodied in its Permanent Commission which has such great value and which I

have pleasure in greeting most cordially in the knowledge and respect of its continual, devoted and fruitful work.

« I would like to particularise even briefly, the reasons for this gratitude and respect.

« Our Railways are indeed not in the condition which we would like and which our economy requires. However, we are doing our best to reach this state; and this fact makes it particularly interesting to us in respect to the technical questions which are going to be discussed here.

« These concern the ageing and therefore the security of metal and concrete bridges, and in view of the fact that we are at present modernising our engineering works, these questions are of particular importance; we are also specially interested in welding methods, in the transport and laying of long rails and in details concerning the wear of the latter and all this information should enable us to obtain information to help us with the task we have undertaken to renew our permanent way as quickly as we are able to do so.

« I feel, however, that the operating of railways is the most important matter so far as we are concerned. Every step must be taken in each particular case so that we can arrive at an organisation which will guarantee the highest degree of improvement with the maximum economy.

« But it is also — and in fact it is essential — to get the overall picture of transport in general. I would even add to have a friendly overall picture and in this way I wish to state that it is undesirable to talk about competition between the different methods of transport. If the different methods of transport are

used in a rational manner each will have its own sphere of action.

« That is why I feel that those who state that the railways will disappear within a few lustres are making a mistake.

« That is why, I am fundamentally convinced that you will take an interest in every one of the problems which is going to be examined here; the construction, equipment and use of rail motor coaches, the maintenance of electric locomotives which will continually increase in numbers, the problem of modernising administration, all these questions are in the forefront of our field of interest.

« You must not be surprised then that having no knowledge of such a complex sphere which has such a high standard in the railway world, I am very reluctant to approach the scientific aspect of these questions.

« I must, however, do this with the utmost assurance and, as a result of this invitation by the Spanish Government, welcome you, gentlemen of the Congress, in the name of the Government.

« You will not find here great achievements in the railway field. You will perhaps see traces of great efforts; there is without doubt an open mind and a receptive technical standard capable of participating in the most imaginative undertakings and in the highest and most arduous tasks; you will, above all, find friendliness without equal, the offer of a sincere and constant desire for collaboration. I am certain that, as has always been the case when two interests are united, when the time comes to leave, we shall all feel that a link has been temporarily severed but which we shall cherish in our hearts.

*(Loud cheers.)*

**Mr. DE VOS, President of the Permanent Commission, replied as follows :**

« Excellency,

« On May 5th 1930, hundreds of official Delegates attending the XIth session of the International Railway Congress Association, met in Madrid in the conference room of the Senate.

« His Majesty, King Alphonso XIII deigned to accept the Presidency of Honour of the Assembly.

« To-day, 520 delegates representing 114 Railway administrations and various organizations operating more than 602 700 km of railway lines, are again the guests of Spain.

« It is difficult to define without deceiving our feeling what we experience in finding ourselves on this soil moulded by a venerable civilization, rich in a glorious past and a thriving present, in the midst of a population with an innate sense of grandeur, cherishing the highest virtues among which flower particularly a natural generosity and such a vast sense of hospitality.

« This feeling springs both from a deep consideration and from the rare pleasure derived by an irresistible movement of sympathy.

« His Excellency, the Chief of State is pleased to give our sessions the greatest distinction by accepting our respectful request which we ventured to make in asking him to take charge of the Presidency of Honour of our XVIIth session.

« We wish to convey to him our respectful gratitude.

« Excellency,

« Ladies and Gentlemen,

« We wish to convey to the Spanish Government and to His Excellency, General





OPENING CEREMONY OF THE XVIIITH CONGRESS at the « Trade Union » House.  
HIS EXCELLENCY SR. DON J. VIGÓN, Minister of Public Works delivering his speech.



Jorge VIGÓN, Minister of Public Works, our deep appreciation for the great interest they have taken in our investigations and for their most valuable assistance.

« We are greeting the present personalities whom we are unable to name individually in view of their number, in spite of the eminence of their functions. We ask each of them to acknowledge at least the share of reverence to which they are entitled.

« The Transport Board, the RENFE and the local Commission overwhelm us with charming consideration, eager to fulfil in anticipation even our most trifling wishes and they are particularly concerned to make up for the dryness of our investigations by providing us with moments of relaxation devoted to the full enjoyment derived from the sight of fascinating treasures of art which abound in their beautiful country. Already to start off with, only a few yards from here, we encounter the marvellous Prado Museum...

« How would it be possible to find the words needed to express to them the full value of our gratitude ?

« I could not do better but tell them how happy we are here.

\* \* \*

May I ask you, Ladies and Gentlemen, to collect your thoughts for a moment to those members of the Permanent Commission who have passed away since the last Session :

Mr. Félix FIORI.  
Mr. Charles GUFFLET.  
Lt. Col. Sir Alan MOUNT.  
Mr. Fritz STEINER.  
Mr. H. D. WARD SMITH.  
Sir Ralph WEDGWOOD.

Mr. René CLAUDON.  
Lt. Col. WILSON.  
Sir James MILNE.

« Although they have departed from us physically, they survive through their works and will always be greatly cherished by us.

« The transport industry experiences a development unknown in the past.

« The high productivity in all sectors of activity propagates the exchange of wealth, from the raw materials to the finished products; the great works of civil engineering require powerful means for carrying to and fro various materials.

« With regard to *passenger* transport, the up-to-date methods of organization enable a reduction in working hours, without reducing however, in fact sometimes even increasing wages, and make it possible to grant paid holidays which are being devoted more and more, to travelling, even by the modest classes of society.

« Thus, people travel no longer by need, but the former privileged persons who could afford to travel out of pure pleasure, are joined now by vast numbers of people.

« Air, sea, road and rail share an intense traffic, in fact so intense that even the road which has no boundless means of absorption suffers frequently from traffic jams and has to undergo strict safety rules with a view to reducing the risks of accidents.

« This state of affairs inspired Mr. BOYAUX, Honorary General Manager of the S. N. C. F. with the following prophecy, the humour of which you will be left to fully appreciate :

« Driving a car on a highway where the  
« vehicles follow one another almost



« without a break will be considered one day as involving an excessive strain. « One will think then of an automatic control, imagining perhaps a kind of driving rope to which the car would, « so to say, be hooked on electrically. « Is it not conspicuous that the railway « solves all the problems which may then « crop up and is it not evident that if « the railway did not exist, one would « have to invent it ? »

« When the road is frozen, the inland waterways icebound, one calls for the rescue of the railway which has to transport apart from its numerous normal users those people who usually do not use it.

« It remains the safest means of land transport, the most regular and powerful one, and also the fastest one between large centres, and as far as modern equipment is concerned, the most comfortable one.

« It tends by the formula rail and road : railway plus car, combined equipment, containers and pallets, etc... to draw near the flexibility offered by the car, and in certain instances it can even compare favourably with it.

« On the whole of its organization, the rail uses or prepares itself to make use of all aspects of energy as well as of the latest achievements in electronics, cybernetics and operational research.

« It is obvious that even if the Administrations of certain big countries could possibly solve all problems purely on a national scale, they have no interest whatsoever in isolating themselves but can only benefit from standardizing as much as possible the solutions which they are to adopt. Further the networks

of the small countries would stay backward if they were left to themselves.

« As the railway passes over frontiers, it must therefore ensure an international continuity of high quality services.

« This requirement is one of the reasons for the extraordinary solidarity linking up the railwaymen of the whole world.

« The International Railway Congress Association has the splendid task to bring together the fruit of experience acquired everywhere and to prepare boldly for the future.

« Eminent specialists, whatever their nationality report on the results of their investigations and put up constructive suggestions.

« Since the subject covers an enormous field, all problems cannot be brought up in the course of one and same session of the Congress. The Permanent Commission makes it a rule to choose the subjects of topical interest.

« The 10 questions, that have been accepted, each of which including many minor questions, have been subdivided according to the specific subject matter into five Sections. 21 reporters have consulted with all the countries members of our Association. The summaries of the reports as well as suggestions of the conclusions to be discussed have been published in a bulletin which contain 148 pages of condensed text.

« It is sufficient to recall that these 148 pages are merely an abridged summary in order to realize the vastness of the preparatory work accomplished by the specialists and the importance of the task to be tackled by the sections.

\* \* \*

« Gentlemen, you will now be asked to proceed with the traditional appointments.

« In the first place, I submit to your approval the proposal to bestow on His Excellency General Jorge VIGÓN, Minister of Public Works, the title of *Vice-President of Honour*.

« I further suggest appointing Mr. Agustín PLANA SANCHO, Under-Secretary of State of Public Works, and President of the Board of Directors of the RENFE, to the *Presidency*.

« As you will recall, it was he who has taken care so splendidly of the overburdening mission to preside the local Commission whose devotion and refined thoughtfulness I have mentioned before.

« You will no doubt agree to appoint as *Vice-Presidents*: Mr. Pascual LORENZO-OCHANDO, General Manager of the Railways, Tramways and Road transport, of the Ministry of Public Work, and Mr. GARCIA-LOMAS y COSSIO, Vice-President of the Board of Directors of the RENFE.

« Both personalities are too well-known as to make it necessary to emphasize their outstanding merits.

« Gentlemen, I record your agreement to these proposals. The unanimous reaction that can be registered constitutes an eloquent homage to the eminent personalities on whom you have centred your choice. We ask them to accept this appreciation.

« Excellency,

« Ladies and Gentlemen,

I can feel at the beginning of our work so much enthusiasm devoted to so much competence, that I am already looking forward, at the thought of the final results of our meeting. And I do not only speak in terms of scientific but

also human relations, because I see how old friendship revives and new friendship is being closed, which so greatly benefits to bring nations together under the reign of peace.

(Warm applause.)

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**His Excellency Sr. Don Agustín PLANA, Under Secretary of State at the Ministry of Public Works, President of the Administrative Board of the RENFE and President of the Session, then delivered the following address :**

« Excellency,

« Ladies and Gentlemen :

« My first words before this Congress are of welcome, at a moment when you kindly called upon me to preside the sessions of the great meeting of railwaymen from a large part of the world which is taking place here.

« A warm and enthusiastic welcome first of all to our Vice-President of Honour, the Minister of Public Works who has accepted the Presidency and represents Spain and the Spanish Government. These words convey the genuine appreciation of this Assembly and the respectful request, Mr. Minister that you assure His Excellency, the Spanish Chief of State that the whole of this railway family and in particular the Spanish railwaymen will devote all their energy and enthusiasm to justify the honour bestowed upon us by His Excellency in having accepted the Presidency of Honour of this Congress.

« A hearty welcome also to all nations represented here in the International Association and to their Chiefs of State to whom I would ask all member delegates

to convey my best wishes of success in their ventures, also in the name of your companions, the Spanish railwaymen.

« A most cordial welcome to you who have come to Spain to attend these important meetings and have just elected me your President. I do not feel that I merit this honour, since the Presidency you have conferred on me outweighs all that I may be able to contribute. However, you can be convinced of my eagerness to help in the achievement of your tasks.

« When the Spanish Government offered in 1954 our capital as the Seat of this XVIIth Session of the International Railway Congress Association, it made a bid for an honour for our country which you have unanimously confirmed, and which was acknowledged by those who were entrusted with the organization of the Session as well as the great family of Spanish railwaymen who are very proud to receive so many famous visitors, the Delegates of the Governments and Railway Administrations as guests to their country during this Session. A most hearty welcome to you also in the name of the railwaymen of my country and as President of the Spanish National Railways.

« Our relationship with the International Railway Congress Association had already been for many years a link of close co-operation, when the XIth Session of the Congress was held in Madrid, in 1930. By renewing this link now, on the occasion of the XVIIth Session which is being inaugurated to-day, we can also feel our old ties of friendship and international collaboration reviving as they have always been deep-rooted in Spain.

« Each Session of the Congress means a milestone in the evolution of the

technique and economy of railway transport and by associating these achievements with the name of Spain, we are extremely grateful to the President and the Members of the Permanent Commission of the International Railway Congress Association for the honour bestowed upon our country.

« During the coming days, important reports will be examined during our meetings, which deal with the problems our President of the International Association has just pinpointed in his memorable speech. But through the technical discussions, it is easy to perceive the daily achievements of their speakers and to discover the man from the laboratory, the engineer of the permanent way or of the work-shops, the financial adviser or the economist. One can see all of them, in their constant study or their practical realisations, in their daily task, which seems dim, but which on a day like this, comes to light, making us discover the marvellous progress of Science.

« I believe that the railway is capable of surviving in the world of to-day where all techniques, including those of transport, progress at a startling speed; I believe this because I am convinced of the flexibility of the railway to adapt itself to circumstances, by taking advantage of these new techniques and conscious of the new missions which the railway has to fulfil within the future framework of transport. We have some striking example of it in Spain, to support my belief, and particularly as far as the railway is concerned showing that what up to now was an experiment is already being introduced on a permanent basis. I think the moment is bound to come when one can state that the technique of rail-



way transportation in our country has experienced a revolutionary change.

« You will by no means find in Spain a perfect railway system. We are still a long way from it, but we are convinced that its improvement is necessary and urgent, since our railway network though not very wide-spread in proportion to the surface of our country, has some special features of very difficult lay-out and it has further suffered owing to unhappy circumstances. Our hope in the progress and survival of the railway is based, apart from undeniable economic realities, on the existence and collaboration of all those international railway organizations which demonstrate world cooperation and understanding; they will no doubt achieve this success by enhancing the railways technically, economically and financially and making them universal instruments of peace and progress. In Spain, we are already determined to go ahead rapidly on this path and we are starting on the improvement of the railway, of our railway, the equipment of which, as you will all know, suffered badly from destruction and shows signs of ageing as a result of long periods of political unrest, indecisions and conflicts which have fortunately come to an end to-day.

« To this effect, taking into account the impossibility of overcoming such initial circumstances by private initiative, the Spanish Government took charge of the Railways which constituted the old companies exploiting their old concessions, and formed in 1941 the Spanish National Railways Company, as a State enterprise, guided and managed by principles of industrial undertakings of private economy.

« In these circumstances and with the active help of the State who understood

the enormous importance of the Railway, it was possible to bring about major improvements, in the course of the last few years, within the framework of a General Reconstruction Scheme the targets of which have practically been reached; a scheme which was approved by the Government at the proposal of the famous Count of Guadalhorce, who was then President of the Spanish Railways and former Vice-President of Honour of the XIth Congress. To-day, Gentlemen, the Presidency of the Railways has been given into much more modest hands, mine, and at this stage we centre our hopes on a new Scheme which we have submitted to the Government : The General Modernization Scheme on the strength of which we want to give a greater speed and early completion to the Reforms which are being carried out on the railway network. We trust that the new Scheme will enable us to reach the greatest efficiency. I shall not give you the details now of this Scheme but it will be sufficient for you to know that their basic ideas are a complete improvement of the track covering the whole network, and the electrification of entire lines, particularly, almost all the trunk lines of the Spanish network. This coupled with great basic improvements of our equipment makes us set our hopes on a bright future and we should like to complete all these achievements as a 5-year Plan.

« In opening the work at the Congress, I wish to convey again to the Assembly my deep appreciation for the honour bestowed upon me on electing me as President of the XVIIth Session which is being inaugurated to-day. I hope to be able to justify the confidence conferred upon me, thanks to the collaboration

which I am sure, I shall receive from all of you. Amity and understanding are necessary for the fruitful achievements of our Congress. I know very well that amity and understanding have always been the outstanding features of the Meetings of this International Railway Association. I rely upon them, Gentlemen.

\* \* \*

« Gentlemen,

« We should now complete the Bureau of the Session by constituting its Secretariat.

« I feel sure that I am meeting your wishes in putting forward the following names as *General Secretaries* :

Mr. P. GHILAIN, Secrétaire Général et Membre d'Honneur de la Commission Permanente.

« Mr. J. PEREZ POZUELO, Ingeniero Jefe de Caminos, Dirección General de Ferrocarriles, Tranvías y Transportes por Carretera and General Secretary of the Local Organizing Commission,

and as *Assistant General Secretaries* :

« Mr. J. L. HARRINGTON, Chief International Services Officer, British Transport Commission, and

« Mr. J. DE LASALA, Subjefe de Departamento, Gabinete de Estudios Generales y Económicos de RENFE, and Assistant General Secretary of the Executive Committee of the Local Organizing Commission.

« I have to join in the words of the President of the International Association when evoking the great figures who are to-day no longer with us. I shall ask all of you to remember our late colleagues.

« As President of the Local Organizing Commission, I also hope that you will all enjoy sojourn in Spain. Spain receives you with open arms, and though I told you at the beginning that I was proud to have you as guests in our country, I should like you to know that when Spain offers her hospitality she does so without reserve, so that in fact we do not consider you any longer as guests but as some of our own people.

« Finally, I want to tell you that I am genuinely proud to hold the Presidency of the Session. I am proud, because I am participating for the first time in the tasks of the International Railway Congress Association. This International Association has rendered countless services to the railways of the world and I am convinced will continue its life in the same spirit as when it was founded in Belgium. In addition, I am proud to receive you all because you greatly honour us during the next few days by your presence. You will realize that a Spaniard is speaking to you in this way, one of many Spaniards, but henceforth all Spaniards are together with you in body and soul.

(*Loud cheers.*)

His Excellency the Minister of Public Works then declared the Session open. The meeting ended at 5.45 p.m.

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# GENERAL BUREAU OF THE XVIIth SESSION.

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## *President of Honour :*

Excmo. Sr. D. Francisco FRANCO BAHAMONDE,  
Chef de l'Etat espagnol.

## *Honorary Vice-President :*

Excmo. Sr. D. Jorge VIGÓN, Ministre des Travaux Publics.

## *President of the Session :*

Excmo. Sr. D. Agustin PLANA SANCHO, Sous-Secrétaire d'Etat aux Travaux Publics et Président du Conseil d'Administration du Réseau National des Chemins de fer espagnols, membre de la Commission Permanente de l'Association.

## *Vice-Presidents :*

Ilmo. Sr. D. Pascual LORENZO OCHANDO, Directeur Général des Chemins de fer, Tramways et Transports par route, membre de la Commission Permanente de l'Association.

Excmo. Sr. D. José MARIA GARCIA-LOMAS Y COSSIO, Vice-Président du Conseil d'Administration de la RENFE, membre de la Commission Permanente de l'Association.

## *Vice-Presidents by privilege (\*) :*

*Argentina.* — Lopez ABUIN, Minister of Transport.

*Austria.* — Hofrat Dr. M. SCHANTL, Generaldirektor der Oesterreichischen Bundesbahnen, membre de la Commission Permanente de l'Association.

*Belgium.* — M. MALDEREZ, Secrétaire Général du Ministère des Communications, membre de la Commission Permanente de l'Association.

*Bulgaria.* — V. Th. VLAIKOV, Conseiller au Ministère des Transports et des Communications.

*Denmark.* — P. CHRISTENSEN, Secrétaire Général du Ministère des Travaux Publics.

*Egypt.* — Eng. Mahmoud Abdel SALAM, Egyptian Republic Railways.

*Finland.* — W.I. HAKKINEN, Councillor at the Ministry of Communications and Public Works.

*France.* — E. DORGES, Délégué Général aux Affaires Internationales du Ministère des Travaux Publics, des Transports et du Tourisme, membre de la Commission Permanente de l'Association.

*Germany.* — Prof. Dr. jur. H.M. OEFTERING, Vorsitzter des Vorstandes der Deutschen Bundesbahn, membre de la Commission Permanente de l'Association.

*Ghana.* — H.F.P. PLUMRIDGE, General Manager of the Ghana Railway.

*Great Britain and Northern Ireland.* — Sir Gilmour JENKINS, Permanent Secretary, Ministry of Transport and Civil Aviation, member of the Permanent Commission of the Association.

*Greece.* — Chr. CANELO POULOS, Directeur Général Adjoint des Chemins de fer de l'Etat hellénique.

*India.* — P.C. MUKERJEE, Chairman, Railway Board, Ministry of Railways, India, member of the Permanent Commission of the Association.

*Republic of Ireland.* — T.C. COURTNEY, Member of the Coras Iompair Eireann, member of the Permanent Commission of the Association.

*Italy.* — Dr.-Ing. V. PERRONE, Inspecteur Général Supérieur Honoraire du Ministère des Transports, membre de la Commission Permanente de l'Association.

*Japan.* — H. SAITO, Director of Foreign Department, Japanese National Railways, member of the Permanent Commission of the Association.

*Lebanon.* — E. ELEFTERIADES, Directeur Général des Chemins de fer D.H.P. et N.B.T.

*Luxemburg.* — A. CLEMANG, Commissaire du Gouvernement près la Société Nationale des Chemins de fer luxembourgeois.

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(\*) Art. 13 of the Rules and Regulations.



- New Zealand.* — R.F. MARRIOTT, Advisory Engineer, New Zealand Government Railways, member of the Permanent Commission of the Association.
- Norway.* — O. BRODAHL, Directeur au Ministère des Communications.
- Pakistan.* — N.A. QUREISHY, Liaison Officer for Pakistan Railways, Ministry of Communications (Railway Division).
- Netherlands.* — F.Q. den HOLLANDER, Président des Chemins de fer néerlandais, S.A., membre de la Commission Permanente de l'Association.
- Poland.* — Prof. Dr.-Ing. W. WYRZYKOWSKI Vice-Directeur de l'Institut de Sciences et de Recherches des Chemins de fer, membre de la Commission Permanente de l'Association.
- Portugal.* — M. DIAS TRIGO, Directeur des Services d'Exploitation et du Matériel à la Direction des Transports Terrestres du Ministère des Communications, membre de la Commission Permanente de l'Association.
- Sweden.* — E.G.J. UPMARK, Directeur Général des Chemins de fer de l'Etat suédois, membre de la Commission Permanente de l'Association.
- Switzerland.* — R. KUNZ, Directeur de l'Office Fédéral des Transports, membre de la Commission Permanente de l'Association.
- Syria.* — R. JEHAMY, Directeur Adjoint, Chef du Service du Mouvement et du Trafic des Chemins de fer de l'Etat syrien.
- Union of South Africa.* — D.H.C. DU PLESSIS, General Manager of the South African Railways and Harbours.
- Union of Soviet Socialist Republics.* — I.A. IVANOV, Director of the All-Union Scientific Research Institute of Railway Transport, member of the Permanent Commission of the Association.
- Yugoslavia.* — Ing. J. ŠVAGEL, Directeur de l'Institut Ferroviaire de la Direction Générale des Chemins de fer yougoslaves, membre de la Commission Permanente de l'Association.
- General Secretaries :*
- P. GHILAIN, Directeur Honoraire du Service du Matériel et des Achats de la Société Nationale des Chemins de fer belges, membre d'Honneur et Secrétaire Général de la Commission Permanente de l'Association.
- J. PÉREZ POZUELO, Ingeniero Jefe de Caminos, Dirección General de Ferrocarriles, Tranvías y Transportes por Carretera, Secrétaire Général de la Commission Locale d'Organisation.
- Assistant General Secretaries :*
- J.L. HARRINGTON, Chief International Services Officer, British Transport Commission.
- J. de LASALA, Ingeniero Subjefe de Departamento, Gabinete de Estudios Generales y Económicos de la RENFE, Secrétaire Général Adjoint de la Commission Locale d'Organisation.
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# BUREAU OF THE SECTIONS.

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## SECTION I. — Way and Works.

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- President :* F. Pérez VILLAMIL, Directeur Adjoint de la « Red Nacional de los Ferrocarriles Españoles », membre de la Commission Permanente de l'Association.
- Vice-Presidents :* Dipl.-Ing. M. JACOBSHAGEN, Direktor der Hauptverwaltung der Deutschen Bundesbahn, membre de la Commission Permanente de l'Association.  
E.T. AALTO, Directeur Général des Chemins de fer de l'Etat de Finlande, membre de la Commission Permanente de l'Association.  
H. SAITO, Director of Foreign Department, Japanese National Railways, member of the Permanent Commission of the Association.
- Principal Secretary :* A. JACOPS, Ingénieur en Chef au Service de la Voie de la Société Nationale des Chemins de fer belges.

### *Secretaries :*

- J. UNAL, Ingénieur, Chef de la Subdivision de l'Entretien à la Région de la Méditerranée de la Société Nationale des Chemins de fer français.
- J.H. GLENDINNING, District Engineer, Peterborough, British Transport Commission.
- J. LOWY SZABO, Ingeniero de la Secretaria General Técnica del Ministerio de Obras Publicas (Spain).
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## SECTION II. — Locomotives and Rolling Stock.

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- President :* J. RATTER, Technical Adviser to the British Transport Commission, member of the Permanent Commission of the Association.
- Vice-Presidents :* P.E.N. SKOV, Directeur Général des Chemins de fer de l'Etat danois, membre de la Commission Permanente de l'Association.  
I.A. IVANOV, Director of the All-Union Scientific Research Institute of Railway Transport, member of the Permanent Commission of the Association.  
L. TVETEN, Directeur Général Adjoint des Chemins de fer de l'Etat norvégien.
- Principal Secretary :* R. SQUILBIN, Ingénieur Principal au Service du Matériel et des Achats à la Société Nationale des Chemins de fer belges.

### *Secretaries :*

- F. MOTTAY, Inspecteur Divisionnaire, Service Matériel et Traction de la Région Nord à la Société Nationale des Chemins de fer français.
- L. NAVARRO GIL, Ingeniero de la 2<sup>e</sup> Zona de Material y Tracción de la División Inspectora de la RENFE.
- A.E. BERESFORD, Indoor Assistant, British Railways.

### SECTION III. — Working.

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*President :* R. SOULARD, Directeur du Mouvement de la Société Nationale des Chemins de fer français.

*Vice-Presidents :* D.J. WANSINK, Directeur Général des Chemins de fer Néerlandais, S.A.  
Prof. Dr.-Ing. W. WYRZYKOWSKI, Vice-Directeur de l'Institut de Sciences et de Recherches des Chemins de fer de l'Etat polonais, membre de la Commission Permanente de l'Association.  
J.P. MUSQUAR, Directeur Général de la Société Nationale des Chemins de fer luxembourgeois, membre de la Commission Permanente de l'Association.  
M. DIAS TRIGO, Directeur des Services d'Exploitation et du Matériel de la Direction des Transports terrestres du Ministère des Communications du Portugal, membre de la Commission Permanente de l'Association.

*Principal Secretary :* A. MARCHAL, Ingénieur Principal au Service de l'Exploitation de la Société Nationale des Chemins de fer belges.

#### *Secretaries :*

P. LANCE, Ingénieur à la Division du Mouvement de la Région Ouest de la Société Nationale des Chemins de fer français.  
B.T. BEKEN, Assistant International Traffic Officer, British Transport Commission.  
R. de URCOLA Y ANSOLA, Ingeniero Subjefe del Departamento de Explotación de la RENFE.

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### SECTION IV. — General.

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*President :* Dr. H. GSCHWIND, Président de la Direction Générale des Chemins de fer fédéraux suisses, membre de la Commission Permanente de l'Association.

*Vice-Presidents :* P.C. MUKERJEE, Chairman, Railway Board, Ministry of Railways, Government of India, member of the Permanent Commission of the Association.  
R.F. MARRIOTT, Advisory Engineer, New Zealand Government Railways, member of the Permanent Commission of the Association.  
W.H. MAASS, Advisory Engineer to the High Commissioner for the Union of South Africa, member of the Permanent Commission of the Association.

*Principal Secretary :* P. SCHOONJANS, Ingénieur Principal au Service de l'Exploitation de la Société Nationale des Chemins de fer belges.

#### *Secretaries :*

V. CANYN, Inspecteur Divisionnaire à la Direction des Etudes Générales de la Société Nationale des Chemins de fer français.  
J. CAHILL, Clerical Officer, Córas Iompair Éireann.  
F. OLIVEROS RIVES, Ingeniero Jefe en los Servicios de Estadísticas de la RENFE.



## SECTION V. — Light Railways and Colonial Railways.

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*President :* Dr.-Ing. V. PERRONE, Inspecteur Général Supérieur Honoraire du Ministère des Transports d'Italie, membre de la Commission Permanente de l'Association.

*Vice-Presidents :* R. HOENS, Directeur Général de la Société Nationale des Chemins de fer vicinaux (Belgique), membre de la Commission Permanente de l'Association.

T.C. COURTNEY, Member of the Córas Iompair Éireann, member of the Permanent Commission of the Association.

D.H.C. DU PLESSIS, General Manager of the South African Railways and Harbours.

Ing. J. ŠVAGEL, Directeur de l'Institut Ferroviaire de la Direction Générale des Chemins de fer yougoslaves, membre de la Commission Permanente de l'Association.

*Principal Secretary :* R. DE CLERCQ, Inspecteur Général à la Société Nationale des Chemins de fer vicinaux (Belgique).

### *Secretaries :*

B. BROCA, Inspecteur Divisionnaire au 1<sup>er</sup> Arrondissement V.B., Région Sud-Ouest de la Société Nationale des Chemins de fer français.

R.E.F. OGGIER, Assistant Electronic Data Process Unit, London Transport Executive.

G. REDER KLINGEBEIL, Ingeniero Agregado al Secretariado de la Comisión Local.

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# Provisional Program

DATES	SECTION I — WAY AND WORKS	SECTION II LOCOMOTIVES AND ROLLING STOCK
Monday, September 29. . . 5 p.m.	←	Inaugural M
Tuesday, September 30. . . 9.30 a.m.	<p>Installation of the Section and fixing the programme of procedure.</p> <p>Question 1. Problems presented by the ageing of bridges and viaducts. Long term effects of fatigue and corrosion in steel bridges and weathering of masonry. Rational methods of maintenance of bridges. Repair and strengthening.</p>	<p>Installation of the Section and the programme of procedure.</p> <p>Question 3. Design and improvement of railcars and multiple-unit trains, as regards : traction ; equipment (location and suspension of the engine, type of transmission characteristics of the construction (body and bogies); weight reduction; sound-proofing, heating, ventilation, air conditioning (supply of air required, advantages and disadvantages); buffer and traction Intercommunication.</p>
Wednesday, October 1. . . 9.30 a.m.	Question 1. ( <i>Continuation and end.</i> )	Question 3. ( <i>Continuation and end.</i> )
Thursday, October 2. . . . 9.30 a.m.	<p>Question 2. Very long rails. Welding methods. Transport of long welded rails and necessary equipment for transporting, laying, fixing, ballast, tamping, etc. Economic aspect of the question. Present tendencies.</p>	<p>Question 4. Comparative study of periodical maintenance and repair of electric locomotives, in particular : the wear of the tyres ; the influence of the wheel diameter, the load, the speed, the type of bogie ; eventually undulatory wear of rails, etc.); the maintenance of traction motors and their transmission (flash at the collectors and methods of coping with it, use of roller bearings for the suspension of the motor, the hollow shafts, etc.); lubricants used (classical and such new as bisulphide of molybdenum); influence of the friction strips of the motor graphs. Kind of work and period of maintenance. Organisation of the maintenance influence of common user (batteries) of the locomotives. Primaries in relation to the type of equipment and the age of the engines.</p>
Friday, October 3. . . . 9.30 a.m.	←	P
Monday, October 6. . . . 9.30 a.m.	Question 2. ( <i>Continued.</i> )	Question 4. ( <i>Continued.</i> )
Tuesday, October 7. . .	<p>9.30 a.m. Question 2. (<i>Continuation and end.</i>)</p> <p>11 a.m. ←</p> <p>4.30 p.m. ←</p>	<p>Question 4. (<i>Continuation and end.</i>)</p> <p>←</p> <p>← Closing ceremony</p>

# the sectional meetings.

SECTION III — WORKING	SECTION IV — GENERAL	SECTION V LIGHT RAILWAYS AND COLONIAL RAILWAYS
Session _____		→
Installation of the Section and fixing the programme of procedure.	Installation of the Section and fixing the programme of procedure.	Installation of the Section and fixing the programme of procedure.
on 5. A) Handling facilities in the depots for consignments in less carloads, containers. General management of the depots. Liaisons between the staff of the depot and delivery services. B) Railway problems regarding the introduction of general palletisation of packages.	Question 7. Advantage of the use of high speed electronic apparatus for certain administrative work such as : 1) The making out of pay slips; 2) Traffic and stores accounts; 3) The checking of the movement of empty and loaded freight wagons, thereby improving the distribution of rolling stock; 4) Compiling more rapidly already existing statistics, thus having also the possibility of preparing new ones.	Question 9. Experience obtained concerning the undulatory wear of rails, Damaging effects on the track, bridges, viaducts and tunnels, and on the rolling stock. Research into the causes of this kind of wear. Measures taken to avoid or to remedy it.
on 5. (Continuation and end.)	Question 7. (Continuation and end.)	Question 9. (Continuation and end.)
on 6. When changing over to electric and Diesel traction for passenger train services, research of the principles which may lead to a rational and efficient organisation of same. For this purpose to : work out the technical and economic needs and with this object in view, classify the passenger services according to the needs of the population served, the distances, the volume of passenger traffic and variations; fix, for each category, the traffic hours and advisable frequencies as well as the reasonable requirements of the public for comfort and speed; define the most suitable methods to draw up the timetables (including eventually regular interval train services); choice of the type of train and rolling stock, fixing the runs.	Question 8. Financing and conserving railway properties and assets. Study and comparison for limited companies, partially state-owned companies and State railways, of the financial means used for the normal renewal of installations and rolling stock. Forms of amortisation and renewal, taking into account for the latter, the slow or speedy depreciation of the currency.	Question 10. In view of the development of light railways, what are the means to be adopted in order to reduce the operating costs of these railways and what are the resulting basic amendments? Delimitation of electrification and dieselisation in relation to the traffic, capital costs and operating costs. Co-ordination between rail and road : Possibilities of mixed rail-road vehicles and of specialised vehicles for rail or road; Principles to be followed in regard to investment, in order to improve the returns from, the capital available for the transport industry.
g. _____		→
on 6. (Continued.)	Question 8. (Continued.)	Question 10. (Continued.)
on 6. (Continuation and end.)	Question 8. (Continuation and end.)	Question 10. (Continuation and end.)
g. _____		→
Session. _____		→



# Summary report of the discussions in the sections.

## 1st SECTION. — Way and Works.

*President* : F. PEREZ-VILLAMIL.

*Vice-Presidents* : M. JACOBSHAGEN, E.T. AALTO and H. SAITO.

*Principal Secretary* : A. JACOPS.

### QUESTION 1.

**Problems presented by the ageing of bridges and viaducts. Long term effects of fatigue and corrosion in steel bridges and weathering of masonry.**

**Rational methods of maintenance of bridges.**

**Repair and strengthening.**

#### Preliminary documents.

Report (America [North and South], Australia [Commonwealth of], Austria, Burma, Ceylon, Egypt, Western Germany, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by Fr. LEMMERHOLD. (See *Bulletin* for May 1958, p. 639.)

Report (Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Spain, Switzerland, Syria, Turkey, Viet-Nam and Yougoslavia), by Dr.-Eng. G. CIVIDALLI. (See *Bulletin* for June 1958, p. 821.)

*Special reporter* : Dr.-Eng. G. CIVIDALLI. (See *Bulletin* for September 1958, p. 1333.)

### Report of Section I.

(See the *Congress Daily Journal*, No. 2, p. 1; No. 3, p. III; No. 4, p. I and No. 5, p. I.)

**Meeting held on the 30th September 1958.**

The PRESIDENT asked Mr. JACOPS, *Principal Secretary* to read the summaries of the Special Report submitted by Dr. G. CIVIDALLI.

Mr. JACOPS read out successively these summaries.

#### *Summary No. 1 :*

1. It is not possible to foretell the life of a bridge when building it solely on the experience acquired from observing existing bridges.

Best quality materials, the most careful methods of calculation, and new constructional methods lead us to think that the life of new metal and reinforced concrete bridges will be very long, provided they are suitably maintained.

The importance, from the economic point of view, of the life of a bridge is generally not very great and the choice of a type of bridge when it is being planned is determined by other more imperative considerations : cost, operating requirements, maintenance costs.

Considerable discussion ensued, on the third paragraph of this summary in which the following took part, Mr. HOORWEG (*Netherlands Railways*), Mr. R. LÉVI (*S.N.C.F.*), Mr. A. DEAN (*British Railways*), Mr. C. E. DUNTON (*London Transport Executive*) and the SPECIAL REPORTER.

— The following text was adopted.

« It is not possible to foretell the life of a bridge when building it solely on the experience acquired from observing existing bridges.

« Best quality materials, the most careful methods of calculation, and new constructional methods lead us to think that the life of new metal and reinforced concrete bridges will be very long, provided they are suitably maintained.

« The influence of the duration of life of a bridge on the financial charges which this involves is, in general, not great, and the choice of a type of structure to be decided upon is determined by more important considerations. »

#### *Summary No. 2 :*

2. Several Administrations fix the budget allocations for maintenance and renewal as a function of the total value of the bridges; but most of them determine these sums from the condition of the bridges and the experience they have acquired, taking into account their financial possibilities, which often make it impossible to carry out the maintenance work properly.

The PRESIDENT remarked that this Summary was very interesting because certain track renewals involved replacement of structures, because of the increase in the loads to be carried.

After comments by Mr. A. DEAN, the text was agreed in the following form :

« 2. Several Administrations fix the budget allocations for maintenance and renewal as a function of the total value of the bridges; but most of them determine these sums from the condition of the bridges and the experience they have acquired, taking into account their financial possibilities, which often make it impossible to carry out the maintenance work which had become necessary. »

#### *Summary No. 3 :*

3. The progressive increase in the loads generally makes it necessary to check by calculation existing metal bridges in order to decide if they can take the new loads proposed.

The opinions of the Administrations differ as to the proper interpretation of the technological tests which have been carried out on elements from old metal bridges. The stress limits allowed for such bridges vary considerably from one Railway to another.

Mr. M. PORTMANN (*Swiss Federal Railways*) considered that it would be opportune to include in the Summary a short résumé of the most important causes of deterioration of metal bridges.

Messrs. R. LÉVI, DUNTON, P. JULIEN (*Ministère des Travaux Publics et des Transports, France*) and L. CARPENTIER (*S.N.C.F.*) supported the suggestion of the SPECIAL REPORTER, who thought that the Summary should stand without alteration, and that it would be better to consider the suggested amendments during the discussion on Summary No. 5.

Finally, Summary No. 3 of the Special Report was adopted without alteration.

*Summary No. 4 :*

4. To examine metal bridges the Administrations generally make use of sounding by hammer in the case of rivetted assemblies, and measuring the deflections and stresses as well as the use of X rays to check the welds. New processes, such as those based on ultrasonic equipment or magnetisation have already been given a trial on several Railways.

— Adopted without discussion.

*Summary No. 5 :*

5. Good conservation of metal bridges necessitates above all protection against corrosion, which occurs especially at those points which are difficult of access, exposed to dirt, insufficiently ventilated, or likely to collect water.

Consequently, when designing new bridges it is essential to select smooth, simple designs, and adequate constructional arrangements; in addition bridges should be maintained regularly.

After discussion in which Messrs. R. LÉVI, CARPENTIER, IVANOVIC (*Jugoslavian Railways*), A. DEAN, A. DEHAEN (*S.N.C.B.*) PORTMANN and the SPECIAL REPORTER took part, it was decided to appoint a sub-committee; this sub-committee to meet on 1st October and to decide on an amended text, taking into account the discussion which had taken place.

*Summary No. 6 :*

6. Careful painting and regular repainting, carried out after proper preparation of the surfaces (hammering, scraping with metal brushes, in difficult cases descaling by sand jet and sometimes burning off) are the most currently used methods for protecting metal bridges against corrosion.

In general, the paint used is the classic red lead, iron, or chromate of zinc paint (undercoats) and white zinc, white lead, iron oxide, and aluminium paints, or those with a bitumastic or tar base (protective paints).

It is not yet possible to formulate any valid opinions concerning the trials made of special paints based on new formulae (with a vinylitic resin base, lead-metal, chlorated rubber, etc.) which some railways have started to use.

Considerable discussion arose on descaling by jet, and on the provision of an undercoat either in the shops or on the site, and on the use of bituminous paints. The following took part in the discussion: Messrs. CARPENTIER, J. LOHMANN (*Netherlands Railways*), JULIEN, LEMMERHOLD (*German Federal Railways and Reporter*), E.T. WILLIAMS (*Malayan Railways*), H. ALEXANDER (*Nigerian Railways*), DEHAEN and R. LÉVI stressed the necessity of a suitable amendment of the text. The sub-committee referred to above will prepare an amended text.

*Summary No. 7 :*

7. In the opinion of most of the Administrations in the case of rivetted structures, surfaces permanently in contact should be protected by a coat of paint.

In the case of welded structures, on the contrary, this practice may be given up owing to the preparation of the welds.

In addition, it is recommended not to cover these surfaces with paint when high tensile bolts are used for assembly.

On the suggestion of Mr. CARPENTIER, supported by Messrs. DUNTON, JULIEN, DEAN and the SPECIAL REPORTER, the Summary was adopted in the following form :

« 7. In the opinion of most of the Administrations in the case of rivetted structures, surfaces permanently in contact should be protected by a coat of paint.

« In the case of welded structures, on



the contrary, this practice may be given up when the surfaces in contact are assembled by continuous welds.

« In addition, it is recommended not to cover these surfaces with paint when high tensile bolts are used for assembly. »

*Summary No. 8 :*

8. Where local conditions are particularly unfavourable, it is necessary to repaint every two years, whereas intervals of 30 to 40 years between repainting may be possible in certain mountain districts where the air is pure and dry.

Partial repainting makes it possible to increase the intervals between two complete overhauls.

Mr. R. LÉVI started a discussion on the advisability of laying down an average period between consecutive paintings of metal bridges. The following took part in this discussion, Messrs. DUNTON, LEMMERHOLD, EGBUNA (*Nigerian Railways Corporation*), CARPENTIER and WILLIAMS.

The SPECIAL REPORTER drew attention to the differences in the replies which he had received. The PRESIDENT proposed that the wording of the Summary as it appeared in the Special Report should be retained without alteration.

— This proposal was adopted.

*Summary No. 9 :*

9. Methods of protecting metal structures other than painting (metallisation, cathodic protection, use of rustless steel and other metals or alloys) have only been used in special cases.

Encasing in concrete metal parts exposed to the smoke from locomotives is the current practice on certain Railways; in particular

mention must be made of the use of prefabricated concrete or asbestos cement components, which appear to give complete satisfaction.

Following a suggestion by Messrs. A. DEAN, CARPENTIER, DEHAEN and the SPECIAL REPORTER, the following text was agreed :

« 9. Methods of protecting metal structures other than painting (metallisation, cathodic protection, use of rustless steel and other metals or alloys) have only been used in special cases.

« Encasing in concrete metal parts exposed to the smoke from locomotives is the current practice on certain Railways; in particular mention must be made of the use of prefabricated concrete or asbestos cement components, which are giving satisfaction. »

*Summary No. 10 :*

10. Metal bridges are repaired either by replacing damaged parts when possible, or by reinforcing these elements by adding new profiles or sheets by rivetting, bolting or welding. In cases like this, the advisability of using welding is still queried.

Mr. PORTMANN thought that the Summary should be completed by a clearer reference to the employment of welding processes. He was supported by Mr. LEMMERHOLD and Mr. CARPENTIER, by the PRESIDENT and Mr. CIVIDALLI, *Special Reporter*, for this part.

The Summary was adopted in the following form :

« 10. Metal bridges are repaired either by replacing damaged parts when possible, or by reinforcing these elements by adding

new sections or plates by rivetting, bolting or welding. In cases like this, the advisability of using welding is still queried.

« A number of Administrations consider that welding is a practical procedure, which facilitates the work of strengthening structures. It must, however, be used with great care, particularly with wrought iron. »

*Summaries Nos. 11 and 12 :*

11. The all over reinforcement of metal bridges can be obtained by adding new elements, or by strengthening the sections of existing elements or their assemblies.

The majority of Administrations prefer to renew bridges completely rather than carry out large scale reinforcing operations, especially in the case of old iron bridges.

In the case of steel bridges, the choice between building a new bridge and reinforcing an existing bridge must be settled by comparing the cost of the different possible types, including the supplementary or indirect costs, and a conservative estimate of the life of the reinforced bridge, together with the expected maintenance costs, which are generally higher in the case of a reinforced bridge than a new bridge.

12. The construction of masonry and concrete arched bridges must be avoided when it does not appear possible to keep the pressure on the soil within limits compatible with a wide margin of safety.

The success of reinforced concrete bridges depends upon using good quality aggregates with suitable granular structure. The water content should not be too high. The arrangement of the reinforcement metal must be carefully studied and executed, and it must be properly covered.

— Agreed without discussion.

*Summary No. 13 :*

13. The condition of masonry and concrete bridges is generally checked by a visual inspection, noting any possible displacement

of the reference marks, inspecting test pieces, periodically checking the levels, sounding the surface with a hammer; other special non-destructive methods have been given trials, but none of them appear to furnish any certain information concerning the condition of the bridges deep down.

At the suggestion of Mr. CARPENTIER, the text was modified as follows :

« 13. The condition of masonry and concrete bridges is generally checked by a visual inspection, noting any possible displacement of the reference marks, inspecting test pieces, periodically checking the levels, sounding the surface with a hammer; other special non-destructive methods have been given trials, but it is difficult and often expensive to get accurate information about the inner state of the bridges. »

— Adopted.

*Summary No. 14 :*

14. Good conservation of masonry and concrete bridges is only possible if they are sufficiently watertight and have effective drainage systems. These conditions appear to be realised without difficulty in the case of bridges made of longitudinally and transversally prestressed concrete, as well as bridges on which the track is laid directly on the concrete without ballast, where the water quickly drains away. Apart from these special cases a waterproof casing is to be recommended.

Cement mortar casings can give good results when the structures they protect are sufficiently rigid; but in general flexible casings are preferred, made of asphalt or consisting of several layers of material or cardboard impregnated with bitumastic materials, or even metal sheets (generally copper) or plastic materials.

In view of the importance of the casings for the proper conservation of the bridges and the difficulties encountered in renewing them, it is necessary to try and get casings

which will last as long as the bridges they protect. In this connection, the recent introduction of plastic materials has to date given satisfactory results. It is possible to hope that the use of thermo-plastic materials will make it possible to obtain this result, provided the casing itself is suitably protected against damage of a mechanical nature.

For this purpose, the use of a protective coat, generally of concrete or asphalt putty is to be recommended.

Mr. DEHAEN stated that the S.N.C.B. insists on the use of waterproof coverings on structures in pre-stressed concrete because of the dangers of corrosion of the reinforcing steel.

After remarks by Messrs. CARPENTIER, R. LÉVI, A. DEAN, the SPECIAL REPORTER suggested the following text, which was agreed :

« 14. Good preservation of masonry and concrete bridges is only possible if they are sufficiently watertight and have effective drainage systems.

« Although it appears easier to realise these conditions in cases of bridges constructed in longitudinally and transversely pre-stressed concrete, as well as bridges on which the track is laid directly on the concrete without ballast, and where the water quickly drains away, the use of a waterproof covering is recommended, in certain of these cases, as well as in the majority of other cases.

« Cement mortar casings can give good results when the structures they protect are sufficiently rigid; but in general casings are preferred made of asphalt or consisting of several layers of material or fibre, or better still glass fibre impregnated with bitumastic materials, or even metal sheets (generally copper) or plastic materials.

« In view of the importance of the casings for the proper conservation of the bridges and the difficulties encountered in renewing them, it is necessary to try and get casings which will last as long as the bridges they protect. In this connection, the recent introduction of plastic materials has to date given satisfactory results. It is to be hoped that the use of thermo-plastic materials will make it possible to obtain this result, provided the casing itself is suitably protected against damage of a mechanical nature.

« For this purpose, the use of a protective coat, generally of concrete or mastic asphalt is to be recommended. »

#### *Summary No. 15 :*

15. If the masonry or concrete bridge is threatened with deterioration due to a lack of watertightness and when operating reasons prevent the carrying out of repairs to the casing, waterproofing processes may be used applied to the soffits or through them, making it possible to reduce permeability effectively or even doing away with the drains altogether.

— Adopted without alteration.

#### *Summary No. 16 :*

16. Heavier loads and higher speeds can be allowed over old masonry bridges than those provided for when they were designed, provided a very careful check is made of the condition of the bridge; calculations for verifying the strength are not generally considered necessary.

Carrying out work to reinforce masonry bridges with the sole object of allowing heavy loads over them is consequently in practice exceptional.

MESSRS. DEAN, CARPENTIER, DEHAEN and LÉVI made some observations; the



SPECIAL REPORTER suggested the following text which was adopted :

« 16. Heavier loads and higher speeds can be allowed over old masonry bridges than those provided for when they were designed, provided a very careful check is made of the condition of the bridge; calculations for verifying the strength are not generally considered necessary.

« Carrying out work to strengthen masonry bridges with the sole object of allowing heavy loads over them is consequently in practice unusual. »

*Summary No. 17 :*

17. The work on repairing or strengthening the arches involves special precautions to avoid abnormal distribution of the stresses (anchoring irons, seams, jacking, centering).

Partial remaking of the arches is advantageous if it only affects a relatively restricted portion of the bridge and if the condition of the remainder of the arch, abutments and foundations is such that a long useful life can be expected from the repaired bridge.

— Agreed without discussion.

*Summary No. 18 :*

18. The organisation of the inspection and maintenance of bridges varies according to local circumstances; it is not possible to establish any general rules concerning the most rational maintenance methods for bridges.

Where the roads are adequate so that it is easy to get to the place of work by road, it is not advantageous for the railway to do the work itself, unless there is only a small amount of work to be done.

The geographical position and operating conditions on the railways may, on the other hand, alter the position and make it advantageous to carry out work of greater importance, or even oblige the railway to do all its own maintenance work without distinction.

At the suggestion of Mr. A. DEAN the following text was adopted :

« 18. The organisation of the inspection and maintenance of bridges varies according to local circumstances; it is not possible to establish any general rules concerning the most rational maintenance methods for bridges.

« Where the roads are adequate so that it is easy to get to the place of work by road, it may not be advantageous for the railway to do the work itself, unless there is only a small amount of work to be done.

« The geographical position and operating conditions on the railway may, on the other hand, make it advantageous to carry out work of greater importance, or even oblige the railway to do all its own maintenance work without distinction. »

*Summaries Nos. 19 and 20 :*

19. Those Administrations who themselves carry out maintenance work of some importance have specialised gangs, generally used exclusively on the maintenance of metal bridges.

20. The materials needed for the repairs carried out by the bridge gangs are generally supplied from the stocks, stores or depots of the Administrations, whereas those needed for work carried out by contractors are supplied by the latter.

Several Administrations, however, prefer to supply in all cases the paint needed to repaint metal bridges.

— Adopted without discussion.

— The meeting closed at 1.05 p.m.

**Meeting of the 1st October 1958,**

Mr. Pérez VILLAMIL opened the meeting at 9.30 a.m.; he stated that the purpose of the meeting was to produce a revised

text for Summaries Nos. 5 and 6, taking into account the suggestions of the various delegates put forward during the discussions of September 30.

After a new discussion, the *Summaries were adopted in accordance with the following texts :*

*Summary No. 5 :*

« While the opinions of the Administrations varied concerning the influence of fatigue and ageing, it was generally recognised that the observed deterioration can be said to be due to a number of causes, faulty design or construction, and above all corrosion. For good preservation of metal bridges it is of primary importance to protect them against the latter, which is most likely to occur at those places which are difficult of access, exposed to dirt or smoke, insufficiently ventilated, or likely to collect water.

« Consequently, when designing new bridges, it is essential to select smooth, simple designs, and adequate constructional arrangements. This consideration can lead in certain cases to preference being given to welded construction rather than rivetted construction. In addition, bridges should be given regular maintenance. »

*Summary No. 6 :*

« Careful painting and regular repainting, carried out after proper preparation of the surfaces (hammering, scraping with metal brushes, descaling by sand jets or shot blasting, and sometimes flame cleaning) are the most currently used methods for protecting metal bridges against corrosion.

« For new structures, it is generally recommended to apply the first coat of paint in the Workshop after descaling and cleaning.

« In general, the paint used is the classic red lead, iron, or chromate of zinc paint (undercoats) and white zinc, white lead, iron oxide, and aluminium paints, or those with a bitumastic or tar base (protective paints).

« It is not yet possible to formulate any valid opinions concerning the trials made of special paints based on new formulae (with a vinylitic resin base, lead-metal, chlorated rubber, etc.) which some railways have started to use. »

**Meeting of the 2nd October 1958.**

The meeting opened at 9.30 a.m.

The PRESIDENT submitted the summaries published in the previous Daily Journals for the approval of the assembly.

A slight alteration in the English text of Summary No. 2 was made following comments put forward by Mr. DEAN.

The new text adopted is given hereafter :

*Summary No. 2 :*

« Several Administrations fix the budget allocations for maintenance and renewal as a function of the total value of the bridges; but most of them determine these sums from the condition of the bridges and the experience acquired, taking into account their financial resources, which often makes it impossible to carry out all the maintenance work which had become necessary. »

These Summaries were approved, Summary No. 14 was also the subject of minor alterations as proposed by Mr. CARPENTIER, and it was adopted as follows :

*Summary No. 14 :*

« Good preservation of masonry and concrete bridges is only possible if they are sufficiently watertight and have effective drainage systems.

« Although it appears easier to realise these conditions in cases of bridges constructed in longitudinally and transversely pre-stressed concrete, as well as bridges on which the track is laid directly on the concrete without ballast, and where the water quickly drains away, in certain of these cases, as well as in the majority of other cases the use of a waterproof covering is recommended.

« Cement mortar casings can give good results when the structures they protect are sufficiently rigid. In general, coverings are preferred, made of asphalt or consisting of several layers of material or fibre, or better still glass fibre impregnated with bitumastic materials and even metal sheets (generally copper) or sheets of plastic materials.

« In view of the importance of the casings for the proper conservation of the bridges and the difficulties encountered in renewing them, it is necessary to try and get casings which will last as long as the bridges they protect. In this connection, the recent introduction of plastic materials has to date given satisfactory results. It is to be hoped that the use of thermo-plastic materials will make it possible to obtain this result, provided

the casing itself is suitably protected against damage of a mechanical nature.

« For this purpose, the use of a protective coat, generally of concrete or mastic asphalt is to be recommended. »

— The PRESIDENT then passed to the discussion of Question 2.

The complete text of the Summaries adopted is as follows :

### SUMMARIES.

« 1. It is not possible to foretell the  
« life of a bridge when building it solely  
« based on experience acquired from  
« observing existing bridges.

« Best quality materials, the most  
« careful methods of calculation, and  
« new constructional methods lead us to  
« think that the life of new metal and  
« reinforced concrete bridges will be very  
« long, provided they are suitably main-  
« tained.

« The influence of the duration of life  
« of a bridge on the financial charges  
« which this involves is, in general, not  
« great, and the choice of a type of  
« structure to be decided upon is deter-  
« mined by more important considera-  
« tions.

« 2. Several Administrations fix the  
« budget allocations for maintenance  
« and renewal as a function of the total  
« value of the bridges; but most of them  
« determine these sums from the condi-  
« tion of the bridges and the experience  
« acquired, taking into account their  
« financial resources, which often makes  
« it impossible to carry out all the main-  
« tenance work which had become  
« necessary.



« 3. The progressive increase in the  
« loads generally makes it necessary to  
« check by calculation existing metal  
« bridges in order to decide if they can  
« take the new loads proposed.

« The opinions of the Administrations  
« differ as to the proper interpretation  
« of the technological tests which have  
« been carried out on elements from old  
« metal bridges. The stress limits al-  
« lowed for such bridges vary consider-  
« ably from one Railway to another.

« 4. To examine metal bridges the  
« Administrations generally make use of  
« sounding by hammer in the case of  
« rivetted assemblies, and measuring the  
« deflections and stresses as well as the  
« use of X rays to check the welds.  
« New processes, such as those based  
« on ultrasonic equipment or magnetisa-  
« tion have already been given a trial on  
« several Railways.

« 5. While the opinions of the Admi-  
« nistrations varied concerning the in-  
« fluence of fatigue and ageing, it was  
« generally recognised that the observed  
« deterioration can be said to be due to  
« a number of causes, faulty design or  
« construction, and above all corrosion.  
« For good preservation of metal bridges  
« it is of primary importance to protect  
« them against the latter, which is most  
« likely to occur at those places which  
« are difficult of access, exposed to dirt  
« or smoke, insufficiently ventilated, or  
« likely to collect water.

« Consequently, when designing new  
« bridges, it is essential to select smooth,  
« simple designs, and adequate construc-  
« tional arrangements. This considera-  
« tion can lead in certain cases to pre-

« ference being given to welded cons-  
« truction rather than rivetted construc-  
« tion. In addition, bridges should be  
« given regular maintenance.

« 6. Careful painting and regular re-  
« painting, carried out after proper pre-  
« paration of the surfaces (hammering,  
« scraping with metal brushes, descaling  
« by sand jets or shot blasting, and  
« sometimes flame cleaning) are the  
« most currently used methods for pro-  
« tecting metal bridges against corrosion.

« For new structures it is generally  
« recommended to apply the first coat of  
« paint in the workshop after descaling  
« and cleaning.

« In general, the paint used is the  
« classic red lead, iron, or chromate of  
« zinc paint (undercoats) and white zinc,  
« white lead, iron oxide, and aluminium  
« paints, or those with a bitumastic or  
« tar base (protective paints).

« It is not yet possible to formulate  
« any valid opinions concerning the trials  
« made of special paints based on new  
« formulae (with a vinylitic resin base,  
« lead-metal, chlorated rubber, etc.)  
« which some railways have started to  
« use.

« 7. In the opinion of most of the  
« Administrations in the case of rivetted  
« structures, surfaces permanently in  
« contact should be protected by a coat  
« of paint.

« In the case of welded structures, on  
« the contrary, this practice may be  
« given up when the surfaces in contact  
« are assembled by continuous welds.

« In addition, it is recommended not  
« to cover these surfaces with paint

« when high tensile bolts are used for  
« assembly.

« 8. Where local conditions are particularly unfavourable, it is necessary  
« to repaint every two years, whereas  
« intervals of 30 to 40 years between  
« repainting may be possible in certain  
« mountain districts where the air is pure  
« and dry.

« Partial repainting makes it possible  
« to increase the intervals between two  
« complete overhauls.

« 9. Methods of protecting metal  
« structures other than painting (metallization, cathodic protection, use of rustless steel and other metals or alloys)  
« have only been used in special cases.

« Encasing in concrete metal parts  
« exposed to the smoke from locomotives is the current practice on certain Railways; in particular mention  
« must be made of the use of prefabricated concrete or asbestos cement  
« components, which are giving satisfaction.

« 10. Metal bridges are repaired  
« either by replacing damaged parts  
« when possible, or by reinforcing these  
« elements by adding new sections or  
« plates by rivetting, bolting or welding.  
« In cases like this, the advisability of  
« using welding is still queried.

« A number of Administrations consider that welding is a practical procedure, which facilitates the work of  
« strengthening structures. It must, however, be used with great care, particularly with wrought iron.

« 11. The all over reinforcement of  
« metal bridges can be obtained by

« adding new elements, or by strengthening the sections of existing elements  
« or their assemblies.

« The majority of Administrations  
« prefer to renew bridges completely  
« rather than carry out large scale reinforcing operations, especially in the  
« case of old iron bridges.

« In the case of steel bridges, the  
« choice between building a new bridge  
« and reinforcing an existing bridge must  
« be settled by comparing the cost of  
« the different possible types, including  
« the supplementary or indirect costs,  
« and a conservative estimate of the life  
« of the reinforced bridge, together with  
« the expected maintenance costs, which  
« are generally higher in the case of a  
« reinforced bridge than a new bridge.

« 12. The construction of masonry  
« and concrete arched bridges must be  
« avoided when it does not appear possible to keep the pressure on the soil  
« within limits compatible with a wide  
« margin of safety.

« The success of reinforced concrete  
« bridges depends upon using good quality aggregates with suitable granular  
« structure. The water content should  
« not be too high. The arrangement  
« of the reinforcement metal must be  
« carefully studied and executed, and it  
« must be properly covered.

« 13. The condition of masonry and  
« concrete bridges is generally checked  
« by a visual inspection, noting any possible displacement of the reference  
« marks, inspecting test pieces, periodically checking the levels, sounding  
« the surface with a hammer; other special non-destructive methods have been

« given trials, but it is difficult and  
« often expensive to get accurate infor-  
« mation about the inner state of the  
« bridges.

« 14. Good preservation of masonry  
« and concrete bridges is only possible  
« if they are sufficiently watertight and  
« have effective drainage systems.

« Although it appears easier to rea-  
« lise these conditions in cases of bridges  
« constructed in longitudinally and trans-  
« versely pre-stressed concrete, as well  
« as bridges on which the track is laid  
« directly on the concrete without bal-  
« last, and where the water quickly  
« drains away, in certain of these cases,  
« as well as in the majority of other  
« cases the use of a waterproof covering  
« is recommended.

« Cement mortar casings can give  
« good results when the structures they  
« protect are sufficiently rigid. In  
« general coverings are preferred, made  
« of asphalt or consisting of several  
« layers of material or fibre, or better  
« still glass fibre impregnated with bi-  
« tumastic materials and even metal  
« sheets (generally copper) or sheets of  
« plastic materials.

« In view of the importance of the  
« casings for the proper conservation of  
« the bridges and the difficulties encoun-  
« tered in renewing them, it is necessary  
« to try and get casings which will last  
« as long as the bridges they protect.  
« In this connection, the recent intro-  
« duction of plastic materials has to date  
« given satisfactory results. It is to be  
« hoped that the use of thermo-plastic  
« materials will make it possible to ob-  
« tain this result, provided the casing

« itself is suitably protected against  
« damage of a mechanical nature.

« For this purpose, the use of a pro-  
« tective coat, generally of concrete or  
« mastic asphalt is to be recommended.

« 15. If the masonry or concrete  
« bridge is threatened with deterioration  
« due to a lack of watertightness and  
« when operating reasons prevent the  
« carrying out of repairs to the casing,  
« waterproofing processes may be used  
« applied to the soffits or through them,  
« making it possible to reduce permea-  
« bility effectively or even doing away  
« with the drains altogether.

« 16. Heavier loads and higher speeds  
« can be allowed over old masonry  
« bridges than those provided for when  
« they were designed, provided a very  
« careful check is made of the condition  
« of the bridge; calculations for veri-  
« fying the strength are not generally  
« considered necessary.

« Carrying out work to strengthen  
« masonry bridges with the sole object  
« of allowing heavy loads over them is  
« consequently in practice unusual.

« 17. The work of repairing or  
« strengthening the arches involves spe-  
« cial precautions to avoid abnormal  
« distribution of the stresses (anchoring  
« irons, seams, jaggings, centering).

« Partial remaking of the arches is ad-  
« vantageous if it only affects a relatively  
« restricted portion of the bridge and if  
« the condition of the remainder of the  
« arch, abutments and foundations is  
« such that a long useful life can be  
« expected from the repaired bridge.



« 18. The organisation of the inspection and maintenance of bridges varies according to local circumstances; it is not possible to establish any general rules concerning the most rational maintenance methods for bridges.

« Where the roads are adequate so that it is easy to get to the place of work by road, it may not be advantageous for the railway to do the work itself, unless there is only a small amount of work to be done.

« The geographical position and operating conditions on the railways may, on the other hand, make it advantageous to carry out work of greater importance, or even oblige the railway to do all its own maintenance work without distinction.

« 19. Those Administrations who themselves carry out maintenance work of some importance have specialised gangs, generally used exclusively on the maintenance of metal bridges.

« 20. The materials needed for the repairs carried out by the bridge gangs are generally supplied from the stocks, stores or depots of the Administrations, whereas those needed for work carried out by contractors are supplied by the latter.

« Several Administrations, however, prefer to supply in all cases the paint needed to repaint metal bridges. »

— The Summaries were ratified by the Plenary Meeting on October 3.

## QUESTION 2.

**Very long rails. Welding methods. Transport of long welded rails and necessary equipment for transporting, laying, fixing, ballast, tamping, etc.**

**Economic aspect of the question. Present tendencies.**

### Preliminary documents.

Report (America [North and South], Australia [Commonwealth of], Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics, and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by F. JACKSON. (See *Bulletin* for March 1958, p. 379.)

Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Viet-Nam and Yugoslavia), by A. CRESPO MOCORREA. (See *Bulletin* for August 1958, p. 1147.)

Special Reporter : A. JACOBS. (See *Bulletin* for September 1958, p. 1345.)

### Report of Section I.

(See the *Congress Daily Journal*, No. 4, p. II and VII; No. 5, p. IV; No. 6, p. I and IX and No. 7, p. I.)

### Meeting of the 2nd October 1958.

The PRESIDENT called upon Mr. JACOBS, *Principal Secretary and Special Reporter* to read out the *Summaries* of his special report.

*Summary No. 1 :*

1. The name and characteristics of « long welded rails » (L.W. R.) is given to continuous rails of at least 100 m (328' 1''), whatever method be used to assemble them.

Mr. LOHMANN (*Netherlands Railways*), stated that the report appeared to exclude long welded rails in sidings, and suggested that « in main lines and in tunnels » should be added to the preamble to the summaries.

The SPECIAL REPORTER remarked that, while the observation was relevant, it did not change in any way the drafting of the summaries, and he proposed that it should be omitted.

The assembly signified its approval.

Mr. PORTMANN (*Swiss Federal Railways*) considered that the limit of 100 m. was arbitrary, and he considered it would have been preferable to speak of « track without joints » rather than of « long welded rails ». He proposed an amended text.

Dr. SCHRAMM (*Deutsche Bundesbahn*), considered on the contrary that the definition of long welded rails appearing in the questionnaire was suitable, a long welded rail being one the central part of which never moved.

Mr. DUNTON (*London Transport Executive*), stated that London Transport made large use of fixed or frozen joints. For this reason he preferred the simple expression « long rails ».

Mr. KLAREN (*U.I.C.*), likewise submitted a detailed amended text, stating in

particular that the characteristic property of L.W.R. was the presence of a central portion, at least 15 m long, never being subject to any movement whatever due to variations in temperature.

Messrs. R. LÉVI (*S.N.C.F.*) and JULIEN (*Ministère des Travaux Publics et des Transports, France*) considered that the summary should be clear and concise, and supported the draft given above by Dr. SCHRAMM; the SPECIAL REPORTER recalled that this was the definition given in the questionnaire.

A discussion in which Messrs. R. LÉVI, DUNTON, CIVIDALLI, KLAREN and the SPECIAL REPORTER took part showed there was considerable interest in arriving at a clear definition of L.W.R., the principle of which is a function of climatic conditions, the ballast and the method of fastening.

The assembly decided to give further consideration to this question during the next meeting.

*Summary No. 2 :*

2. At the present time L.W.R. have undergone the test of eight years service in various climates, on lines with the heaviest and fastest traffic, without causing any difficulties. They are the best solution for obtaining at one and the same time smooth running, good conservation of the fixed installations and rolling stock, and a considerable reduction in maintenance costs.

Mr. C. FEYRABEND (*S.N.C.F.*), stated that the French experience of L.W.R. amounted not to eight but to nine years.

Mr. JULIEN asked the delegates present if it was true that there had not been any difficulties. Mr. C.E. DUNTON and Mr.

JOSSE (*Régie des Chemins de fer de l'A.O.F.*) Mr. CRESPO (*Reporter*) and Mr. R. LÉVI, stated that no difficulties peculiar to L.W.R. had been encountered. Mr. R. LÉVI stated that if the laying and maintenance were made with care there were not any special difficulties.

The Summary was adopted with the following text :

« 2. At the present time long welded rails have undergone the test of nine years service in various climates, on lines with the heaviest and fastest traffic, without causing undue difficulty. They are the best solution known today for obtaining at one and the same time smooth running, good preservation of the track and of the rolling stock, and for reducing considerably the maintenance costs. »

#### *Summary No. 3 :*

3. From the theoretical point of view, there are no limits to the length of L.W.R., for this reason the determination of the actual continuous length the most suitable in practice is based on practical considerations. These have not been selected identically by the different Administrations.

Certain Railways fix this length simply according to operating requirements (isolating joints, track equipment, etc.), whereas others consider that a length of 800 to 1 000 m (2 600' to 3 200') should not be exceeded, for reasons of convenience.

There is an unanimous opinion that long rails should not be used on curves of small radius, but the limiting radius of curve varies considerably according to the Railways: in general, a radius of 500 m (1 600') is considered the minimum admissible on standard gauge lines; in the case of lines of less than standard gauge it would appear that a higher limit, in the vicinity of 800 m (2 600'), is desirable for security.

An initial discussion took place on the use made by certain Administrations of expansion devices, and on the distance between such devices. Mr. LÉVI stated that the distance of 800 or 1 000 metres was a question of convenience and not of safety.

After considerable discussion on the minimum radius of curvature suitable for L.W.R., Mr. FEYRABEND, supported by Mr. LÉVI, stated that even on the same railway system, these lengths could differ according to the type of sleepers used.

Mr. NICOLAS (*Régie des Chemins de fer du Cameroun*), stated that when the climatic conditions were favourable, and when the annual variations in temperature were moderate, L.W.R. had been laid without mishaps on curves with a radius of 120 metres. Mr. JOSSE supported the point of view of Mr. NICOLAS.

Mr. R. LÉVI stated that in his opinion one should not make any distinction in this connection between narrow and standard gauge track: the only points to be taken into consideration being the weight of the rail and the resistance of the road-bed. Mr. DUNTON considered that there was a difference between standard and narrow gauge track. Messrs. LÉVI, JOSSE, JUSSEAU (*Chemins de fer Algériens*) and FEYRABEND, stated that from wide experience there is no difference. Further, Mr. JOSSE stated that there was no difference between concrete and metal sleepers as far as the behaviour of the track was concerned. Dr. SCHRAMM added that recent trials had shown similar behaviour between tracks laid with wood and concrete sleepers in curves of a radius down to 250 metres.



Mr. LÉVI, supported by Mr. FEYRABEND, said that in his opinion the lateral resistance of the track was not the only factor to be considered; the weight of the track was an important consideration, and it was difficult to state an absolute limit.

After this discussion, Summary No. 3 was adopted with the following text :

« 3. From the theoretical point of view, there are no limits to the length of L.W.R., for this reason the determination of the actual continuous length the most suitable in practice is based on practical considerations. These have not been selected identically by the different Administrations.

Certain Railways fix this length simply according to operating requirements (insulated joints, track equipment, etc.), whereas others consider that it is not desirable to exceed a length of 800 to 1 000 m.

« Most Administrations have used long welded rails when the alignment did not include any curves of a radius less than 500 to 800 m according to the type of sleeper. The minimum radius varies according to the regions and the track materials. In particularly favourable conditions, certain Administrations have used long welded rails even in curves of a radius of less than 200 m. »

*Summary No. 4 :*

4. The possible use of expansion devices depends upon the effective length of the rails: those Railways who limit the practical length of their rails to about one kilometre consider it generally necessary to use devices of this kind; on the other hand, those Railways who use long rails of various lengths, only limited by special circumstances, state that ordinary fishplating, completed by numerous anticreep devices, can be satisfactory.

Mr. DUNTON considered that the expression « expansion device » was hardly correct for it was a question of a device which would allow of the adjustment of the rails and subsequent de-stressing.

Mr. LÉVI agreed with Mr. DUNTON's remarks, and pointed out the usefulness of these devices for de-stressing, and for possible replacement of sections of damaged rails. He put the question to Administrations who do not use expansion devices as to what procedure was adopted in cutting out a piece of rail, if the temperature of the rail exceeded to any appreciable extent the laying-in temperature.

Dr. SCHRAMM, in reply to this question, stated that the rail was heated or cooled artificially, and that one made use of fishplates and a large number of anti-creep devices. This made it possible to insert a length of fishplated rail, and to put off welding until a normal temperature had been reached.

Mr. DUNTON considered that thanks to the use of such devices, alterations to the ballast bed in particular could be obviated. Supported by Mr. LÉVI and Mr. FEYRABEND, he would like reference to be made to de-stressing.

Mr. JOSSE stated that considerable use of L.W.R. had been made with anti-creep devices, and that he would like to see the text amended to include the word « possibly ».

Summary 4 was adopted as follows :

« 4. The use of devices for the initial adjustment and the subsequent adjust-

ment or de-stressing of the rails depends upon the practices of each Administration. The Administrations which use these devices consider it necessary to de-stress rails in cases of difficulty. Other Administrations, on the contrary, consider that normal fishplating, together with a large number of anti-creep devices, give satisfaction. »

*Summary No. 5 :*

5. All types of fastenings which assure close contact between the rail and the sleeper can be used with L.W.R. As far as elastic rail-spikes are concerned, experience of this device is still insufficient at the present time for a final judgment to be passed.

At the suggestion of Messrs. PORTMANN, FEYRABEND and DUNTON, it was decided to alter « ... which assure close contact... » to read « ... which assure firm and permanent connection... » Mr. JACKSON (*Reporter*), stated that for this purpose American Administrations made use of spikes.

Mr. FEYRABEND said that in such cases numerous anti-creep devices were used.

The following amended text was adopted :

« 5. All types of fastenings which assure firm and permanent connection between the rail and the sleeper can be used with L.W.R. As far as elastic rail-spikes are concerned, experience of this type of fastening is insufficient at the present time for a final judgment to be passed. »

*Summary No. 6 :*

6. Although the weight of concrete sleepers makes them particularly suitable for lines laid with L.W.R., they can equally well be laid on wood or metal sleepers.

After a short discussion between Messrs. LOHMANN, FEYRABEND and DEAN (*British Railways*), the summary was adopted with minor alterations as follows :

« 6. Although the weight of concrete sleepers makes them particularly suitable for lines laid with L.W.R., they can also be laid with security on wood or metal sleepers. »

*Summary No. 7 :*

7. The ballast should consist of hard, sharp stones, of between 25 and 60 mm.

Wide ballast profiles should be used, the space between sleepers be well filled in and the bench heaped up in order to increase the transversal resistance of the track.

An exchange of views between Messrs. JOSSE, FEYRABEND, LEGRAND (*S.N.C.F.*) and SCHRAMM, took place regarding the ballast profile to be recommended for adoption, and agreement was reached on the following text :

« 7. The ballast should consist of hard, sharp stones between 25 and 60 mm in size.

« Wide ballast profiles must be maintained, the space between sleepers should be well filled in and an adequate shoulder provided. »

*Summary No. 8 :*

8. The method preferred for making L.W.R., both from the technical and economic points of view, is first of all to flash weld in the shops the longest possible lengths of rail, transport these to their destination by suitable rakes, and weld them together on the line by the most suitable method. For this latter, the most widely used method is thermit welding. The above two methods of welding do not require any heat treatment after completion.

Messrs. DEAN, JACKSON and LOHMANN, stated that certain Administrations considered heat treatment to be necessary.

The SPECIAL REPORTER, supported by Messrs. FEYRABEND and CRESPO, stated that Administrations, which have made extended use of welding, do not carry out heat treatment any longer. Messrs. JOSSE, ALEXANDER (*Nigerian Railway Corporation*) and NICOLAS, stated that flash-butt welding in the shops could not be carried out economically by all Administrations, and in particular, by colonial Administrations, which are therefore forced to make extended use of thermit welding.

The Summary was then adopted with the following text :

« The method generally preferred for making L.W.R. is first of all to flash-butt weld in the shops the longest possible lengths of rail, transport these to their destination on suitable rakes, and join them together on the site by the most suitable method. For this latter, the most widely used method is thermit welding.

The majority of the Administrations agree that the two welding processes cited above do not need any subsequent heat treatment. »

#### *Summary No. 9 :*

9. The temperature considered best for the final tightening up of the L.W.R. is a few degrees higher than the average between the extreme temperatures of the year. If this optimum temperature is not reached at the time the work is carried out, it is recommended to free the stresses and regulate again the length of the rails as soon as the desired conditions are realised. Heating the rails in order to obtain the desired laying temperature artificially has been tried sporadically, but is not the general practice.

Mr. FEYRABEND contended that the conditions laid down for the necessary de-stressing are too strict, and he stated that the S.N.C.F. did not undertake adjustments for track laid between 14° and 30° (centigrade); this range might even be extended.

A discussion followed in which Messrs. DUNTON, JACKSON, LEGRAND and the SPECIAL REPORTER took part.

The PRESIDENT decided that consideration should be given to drafting a suitable text during the meeting of the 6th October and closed the proceedings at 12.50 p.m.

#### **Meeting of the 6th October 1958.**

— The meeting was opened at 9.30 a.m.

The PRESIDENT submitted for the definitive approval of the Section the Summaries discussed during the previous meeting and began with the discussion of Summary 1, left in abeyance.

#### *Summary No. 1 :*

The SPECIAL REPORTER, supported by Mr. FEYRABEND considered that the definition should reflect the terms of the questionnaire.

Mr. FEYRABEND submitted a text on which agreement was reached after comment by Mr. VAUBOURDOLLE (*S.N.C.F.*), with the insertion of a complementary phrase suggested by Mr. KLAREN. The latter insisted on the two main factors which were; in his opinion, climatic conditions and ballast; fixing conditions as brought out by Mr. PORTMANN in the



course of the meeting on 2nd October, having only a secondary importance.

The following text was adopted :

« 1. The name of long welded rails (L.W.R.), is given to rails the central part of which never undergoes any movement due to temperature alterations. The minimum length fulfilling this condition depends on conditions of climate, ballast, and method of fixing the rails. Normally, this minimum length is of the order of 100 metres. »

*Summary No. 2 :*

— This Summary was approved by the Section as previously worded.

*Summary No. 3 :*

Mr. JACKSON contended that the suggested text did not allow of long welded rails being used in curves, and considered that a more explicit wording should be sought.

MESSRS. FEYRABEND, JOSSE and JUSSEAU considered that the text did not give rise to confusion but suggested that « ... have used long welded rails... » should read « ... use long welded rails... » to indicate that this practice still continued. Messrs. JACKSON and DEAN wished to have the favourable conditions for the use of L.W.R. in curves more clearly defined.

Mr. VAUBOURDOLLE (S.N.C.F.), suggested therefore that « ... varies according to the regions... » should be changed to « ... varies according to the climatic conditions... ».

Mr. DUNTON intervened to stress the opinion that he had given during the meeting of the 2nd October. In his opinion, one should take into account the difference in the resistance as between standard and narrow gauge track, the track being considered as a beam.

MESSRS. JOSSE, JUSSEAU and FEYRABEND maintained the opposite point of view.

— The text finally adopted was worded as follows :

« 3. From the theoretical point of view, there are no limits to the length of L.W.R., for this reason the determination of the actual continuous length the most suitable in practice is based on practical considerations. These have not been judged in the same way by the different Administrations.

« Certain Railways fix this length simply in accordance with operating requirements (track equipment, such as insulated joints and switches and crossings), whereas others consider that it is not desirable to exceed a length of 800 to 1 000 m.

« The majority of Railways use long welded rails in straight track and in curves of which the radius is not less than 500 to 800 metres, according to the type of sleepers used. The minimum radius varies in accordance with climatic conditions and the materials used in the track. In particularly favourable conditions certain Railways come down to curves of a radius less than 200 metres. »

*Summary No. 4 :*

Mr. DUNTON stated that the text relating to his previous intervening did not

correctly set forth his contention with regard to the use of expansion devices. He stated that the use of such devices made it possible for heavy track repairs or emergency work to be carried out with safety by releasing the stresses in the rails. Supported by Messrs. LÉVI and FEYRABEND, he would like reference made to this idea of de-stressing. A note was made of this contention in the final drafting of the text.

Summary No. 4 was adopted with the following wording :

« 4. The use of devices for the initial adjustment and the subsequent adjustment or de-stressing of the rails depends upon the practices of each Administration. The Administrations which use these devices consider it necessary to de-stress rails in cases of difficulty. Other Administrations, on the contrary, consider that normal fishplating, together with a large number of anti-creep devices, give satisfaction. »

*Summary No. 5 :*

— Adopted without discussion.

*Summary No. 6 :*

A discussion in which the following took part, Messrs. LEMMERHOLD, DEAN, FEYRABEND, VAUBOURDOLLE, CRESPO, JOSSE, SECRETAIN (*Chemin de fer de Gafsa*), ensued on the subject of alterations in the method of track laying dictated by the use of long welded rails. It was decided to state definitely the minimum number of sleepers per kilometre of track.

— The following text was adopted :

« 6. Although the weight of concrete sleepers makes them more suitable for

use in tracks laid with L.W.R. such rails can equally well be laid with complete safety on wooden or metal sleepers. The number of sleepers per kilometre is generally the same as in tracks laid with fishplates, always provided the number is at least 1 500. »

*Summary No. 7 :*

Mr. NICOLAS contended that the obligation to use ballast consisting of hard stone was too restrictive, and Mr. FEYRABEND, remarked, moreover, that a number of Administrations made large use of slag.

At the suggestion of Messrs. DEAN and DUNTON a correction was made in the English text regarding the ballast profile.

— The modified text was worded as follows :

« The ballast should consist of hard, sharp elements of between 25 and 60 mm in size.

« Wide and full ballast profiles must be provided and maintained. »

*Summary No. 8 :*

At the suggestion of Mr. FEYRABEND, and after a short discussion between Messrs. JOSSE and NICOLAS, a text was adopted setting out the interest in flash-butt welding in rail lengths as long as possible whenever economic and technical conditions allow.

Summary 8 was adopted in the following amended wording :

« 8. The method preferred where possible for making L.W.R. is to flash-butt weld in the shops the longest lengths

of rail that can be welded, transport these to their destination on suitable rakes, and join them together on the site by the most suitable method. For the latter most widely used method is thermit welding.

« The majority of Administrations agree that the two welding processes cited above do not need any subsequent heat treatment. »

The Assembly then passed on to the discussion of Summary No. 9, which was left in abeyance at the previous meeting.

*Summary No. 9 :*

The SPECIAL REPORTER recalled the arguments brought forward at the beginning of the discussion held at the meeting of 2nd October.

Mr. FEYRABEND considered that the text put forward was too restrictive, he considered that the use of L.W.R. necessitated certain precautions but not such that they rendered the laying very difficult.

Mr. JOSSE insisted on the idea of a range of temperature. Mr. CIVIDALLI would like an approximate indication of the temperature range to be given by some of the Administrations. Mr. DUNTON considered it desirable for L.W.R. to be laid at a temperature approximating to the average.

A discussion followed between Messrs. SCHRAMM, FEYRABEND, CRESPO and NICOLAS, on the technical methods of laying (use of heating by certain Administrations, allowable temperature range, maintenance works during the transitional periods between laying and de-stressing).

Agreement was reached on the text given hereafter. :

« 9. The final tightening of L.W.R. should be made within a pre-determined temperature range, which according to the experience of most Railways may be rather wide (up to 25° centigrade).

« The mean of this range should equal or exceed the mean annual temperature of the rail.

« If at the time of laying the track the fastenings have been tightened outside the desired range of temperature, it is recommended that de-stressing should be carried out, followed by a new tightening, when the required conditions are fulfilled. »

The Assembly proceeded with the discussion of the last Summaries.

*Summary No. 10 :*

10. The spacing of the sleepers and the method of putting new rails into service — in particular, speed restrictions on newly laid rails — are the same as those laid down for lines of similar category with relatively short rails.

After an exchange of views between MESSRS. ALEXANDER, DEAN, FEYRABEND, DUNTON, CRESPO, (*Reporter*) bearing particularly on the constitution of the track to be laid, as following from the discussion on Summary No. 6; it was decided in agreement with the SPECIAL REPORTER to substitute for this summary, Summary No. 12 of Mr. CRESPO's report.

« 10. The maximum speeds allowed on lines laid with L.W.R. are the same as those allowed on lines laid with standard length rails.



« Likewise the speed restrictions on newly laid L.W.R. are similar to those laid down for newly laid classic type lines. »

— Adopted.

*Summary No. 11 :*

11. The most suitable maintenance methods have not yet been finally perfected. But it has already been learnt that no work involving removal of the ballast from the line should be carried out when the temperature exceeds to any appreciable extent that at the time of laying or most recent adjustment. As regards the maintenance of the level, it is generally recommended to use mechanical tamping rather than shovel packing.

Various observations were made by Mr. DUNTON (who insisted on the necessity for de-stressing before any important work) and by Messrs. JOSSE, LOHMANN and LEGRAND.

The advantage of maintenance by tamping or shovel packing was discussed by Messrs. FEYRABEND, GARDINI (*Italian State Railways*) and SCHRAMM. Agreement was reached on a text prepared by Mr. R. LÉVI, who indicated that the majority of Administrations used the same methods of maintenance for L.W.R. as for rails of normal length.

This Summary was worded as follows :

« 11. The most suitable methods of maintenance have not yet been definitely determined, but the majority of the Administrations adopt the same methods for L.W.R. as they do for rails of normal length. In general, it is agreed that no work involving removal of the ballast, or lifting the track, should be carried out, when the temperature appreciably exceeds that at which the track was laid in or most recently adjusted. »

*Summary No. 12 :*

12. Administrations with a certain experience of L.W.R. are agreed that the safety of the traffic over L.W.R. is fully assured.

After a short exchange of opinions between Messrs. DUNTON and FEYRABEND, the SPECIAL REPORTER admitted that this Summary merely reproduced the ideas expressed in the previous summaries, and suggested that it should be wholly deleted. This was agreed.

The meeting closed at midday.

Next meeting to be held on Tuesday, 7th October at 9.30 a.m.

**Meeting of the 7th October 1958.**

— The meeting was opened at 9.30 a.m.

The PRESIDENT submitted all the summaries of Question No. 2 for the approval of the meeting. The PRINCIPAL SECRETARY read these in French and English.

A few minor corrections in the wording of the French text were made at the suggestion of Messrs. CIVIDALLI, FEYRABEND and VAUBOURDOLLE, and in the English text at the request of Messrs. DEAN and DUNTON.

Messrs. LOHMANN, VAUBOURDOLLE and CIVIDALLI, in the name of the delegates, thanked the PRESIDENT and the PRINCIPAL SECRETARY for the efficient way in which the debates had been conducted.

The PRESIDENT closed the meeting at 10.05 a.m. He thanked all those present and wished them a safe journey home.

— The complete text of the Summaries adopted is given hereafter :

### SUMMARIES.

« 1. The name of long welded rails (L. W. R.) is given to rails the central part of which never undergoes any movement due to temperature alterations. The minimum length fulfilling this condition depends on conditions of climate, ballast, and method of fixing the rails. Normally, this minimum length is of the order of 100 metres.

« 2. At the present time long welded rails have undergone the test of nine years' service in various climates, on lines with the heaviest and fastest traffic, without causing undue difficulty. They are the best solution known today for obtaining at one and the same time smooth running, good preservation of the track and of the rolling stock, and for reducing considerably the maintenance costs.

« 3. From the theoretical point of view, there are no limits to the length of L. W. R., for this reason the determination of the actual continuous length the most suitable in practice is based on practical considerations. These have not been judged in the same way by the different Administrations.

« Certain Railways fix this length simply in accordance with operating requirements (track equipment, such as insulated joints and switches and crossings), whereas others consider that it is not desirable to exceed a length of 800 to 1 000 metres.

« The majority of Railways use long welded rails in straight track and in curves of which the radius is not less

« than 500 to 800 metres, according to the type of sleepers used. The minimum radius varies in accordance with climatic conditions and the materials used in the track. In particularly favourable conditions certain Railways come down to curves of a radius less than 200 metres.

« 4. The use of devices for the initial adjustment and the subsequent adjustment or de-stressing of the rails depends upon the practices of each Administration. The Administrations which use these devices consider it necessary to de-stress rails in cases of difficulty.

« Other Administrations, on the contrary, consider that normal fishplating, together with a large number of anti-creep devices, give satisfaction.

« 5. All types of fastening which assure firm and permanent connection between the rail and the sleeper can be used with L. W. R. As far as elastic rail-spikes are concerned, experience of this type of fastening is insufficient at the present time for a final judgment to be passed.

« 6. Although the weight of concrete sleepers makes them more suitable for use in tracks laid with L. W. R. such rails can equally well be laid with complete safety on wooden or metal sleepers. The number of sleepers per kilometre is generally the same as in tracks laid with fishplates, always provided the number is at least 1 500.

« 7. The ballast should consist of hard, sharp elements, of between 25 and 60 mm in size.

« Wide and full ballast profiles must  
« be provided and maintained.

« 8. The method preferred where possible for making L. W. R. is to flash-butt weld in the shops the longest lengths of rail that can be welded, transport these to their destination on suitable rakes, and join them together on the site by the most suitable method. For the latter, the most widely used method is thermit welding. The majority of Administrations agree that the two welding processes cited above do not need any subsequent heat treatment.

« 9. The final tightening of L. W. R. should be made within a pre-determined temperature range, which according to the experience of most Railways may be rather wide (up to 25° centigrade).

« The mean of this range should equal or exceed the mean annual temperature of the rail.

« If at the time of laying the track the fastenings have been tightened outside the desired range of tempera-

tures, it is recommended that destressing should be carried out, followed by a new tightening, when the required conditions are fulfilled.

« 10. The maximum speeds allowed on lines laid with L. W. R. are the same as those allowed on lines laid with standard length rails.

« Likewise the speed restrictions on newly laid L. W. R. are similar to those laid down for newly laid classic type lines.

« 11. The most suitable methods of maintenance have not yet been definitely determined, but the majority of the Administrations adopt the same methods for L. W. R. as they do for rails of normal length. In general it is agreed that no work involving removal of the ballast, or lifting the track, should be carried out, when the temperature appreciably exceeds that at which the track was laid in or most recently adjusted. »

— These Summaries were ratified by the Plenary Meeting of the 7th October.



## SECTION II. — Locomotives and rolling stock.

*President* : J. RATTER.

*Vice-Presidents* : P.E.N. SKOV, I.A. IVANOV and L. TVETEN.

*Principal Secretary* : R. SQUILBIN.

### QUESTION 3.

#### **Design and improvement of railcars and multiple-unit Diesel trains, as regards :**

- traction power equipment (location and suspension of the engine, type of transmission);
- characteristics of the construction (body and bogies);
- weight reduction;
- sound-proofing, heating, ventilation, air conditioning (supply of power required, advantages and drawbacks);
- buffer and traction gear. Intercommunication.

#### **Preliminary documents.**

Report (America [North and South], Australia [Commonwealth of], Burma, Ceylon, Egypt, India, Iran, Iraq, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics, the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories, West Germany, by Dr.-Eng. G. A. GAEBLER. (See *Bulletin* for February 1958, p. 145), and

Report (Austria, Belgium and Colonies, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Spain, Switzerland, Syria, Thailand, Turkey, Viet-Nam, and Yugoslavia), by A. S. CANA-

VEZES, Jr. (See *Bulletin* for April 1958, p. 499.)

Supplement to Report, by A. S. CANAVEZES, Jr. (See *Bulletin* for August 1958, p. 1261.)

*Special Report* by Dr.-Eng. G. A. GAEBLER. (See *Bulletin* for September 1958, p. 1347.)

#### **Report of Section II.**

(See the *Congress Daily Journal*, No. 2, p. III; No. 3, p. III and p. XI; No. 5, p. I; No. 7, p. IV.)

#### **Meeting held on the 30th September 1958.**

The meeting was opened at 9.30 a.m. by the PRESIDENT, MR. J. RATTER, who invited Dr. G.A. GAEBLER, *Special Reporter*, to submit the summaries of his special report.

After a short introductory survey, Dr. GAEBLER read :

#### *Summary No. 1 :*

1. The number of types of different designs of Diesel railcars should be limited as far as practicable. The economy of railcar operations improves with the number of completely identical units in service in the area of the Administration.

— This text was adopted without discussion.

*Summary No. 2 :*

2. Whilst it may be necessary, for reasons of traffic requirements, to provide various types of interior arrangements and equipment, all efforts should be made to maintain uniformity of design, as relating to the most important components subject to wear and tear (as, for instance, traction power equipment, auxiliary machinery, running gear, brakes, buffing and draw gear, doors, windows, etc.).

Mr. TOURNEUR (*Société Nationale des Chemins de fer français*), proposed that throughout the French text the term « motorisation » should be replaced by « équipement moteur ».

Mr. C. MARTIN (*Société Nationale des Chemins de fer français*) commented on the relatively wide importance of the details subject to wear, shown in brackets, and proposed that the French text should be modified.

The English text remained unchanged.

*Summary No. 3 :*

3. The installation of a single traction power unit (Diesel engine plus its transmission) in each motor unit is the more economical method, if suitable equipment with the necessary power output is available on the market.

The installation of two separate units, for reasons of operating reliability, is no longer necessary, in view of the present high standard of design and manufacturing technique.

A subdivision of the total power output in two separate units may be opportune for the following reasons :

- (a) limitation of types of mechanical equipment in use;
- (b) to permit the installation of two smaller underfloor engines instead of a single large unit which, due to its size, would have to be mounted in the car body, in order to profit from the gain of space (for passenger accommodation) obtained by this solution;

(c) to permit the utilization of engines and/or transmissions available from mass production of the motor vehicle industry, thus benefiting by the relatively low first cost and maintenance charges for spare parts.

A division of the power unit in two may also become inevitable, if a high power requirement makes the installation of a single unit impracticable.

Mr. TOURNEUR proposed that in the French text the term « élément moteur » should be replaced by « unité motrice ».

After an exchange of views between Messrs. ALSTRÖM (*Swedish State Railways*), GAEBLER, C. MARTIN, TOURNEUR, NAVARRO (*Spanish National Railways and Secretary*) and the PRESIDENT on the question considered in sub-paragraph (b), it was decided to eliminate this, which conflicted with the last paragraph and with Summary No. 7, and incorporate a slight modification in the latter.

The text of the Summary No. 3 thus reads :

« 3. The installation of a single traction power unit (Diesel engine plus its transmission) in each motor unit is the more economical method, if suitable equipment with the necessary power output is available on the market.

« The installation of two separate units, for reasons of operating reliability, is no longer necessary, in view of the present high standard of design and manufacturing technique.

« A subdivision of the total power output in two separate units may be opportune for the following reasons :

« (a) Limitation of types of mechanical equipment in use;

« (b) To permit the utilization of

engines and/or transmissions, available from mass production of the motor vehicle industry, thus benefiting by the relatively low first cost and maintenance charges for spare parts.

« A division of the power unit in two may also become inevitable, if power requirements make the installation of a single unit impracticable. »

#### *Summary No. 4 :*

4. High speed engines are, as a rule, preferable for use in Diesel railcars for the following reasons :

- (a) dimensions are smaller, thus requiring less space for a given power rating and facilitating the installation;
- (b) the engine has less weight, and component parts are correspondingly lighter and, consequently, are generally less expensive.

Mr. BOULANGER (*Belgian National Railways*), stated that the mention of reduced expense for component parts of high speed engines introduced an impression of comparatively cheaper maintenance as between fast and slower engines in connection with which it was premature to make any comments; he suggested that this impression should be eliminated.

Mr. C. MARTIN proposed a simplification of the wording as follows :

« 4. High speed Diesel engines are, as a general rule, preferable for use in Diesel railcars because their dimensions are smaller, they are easier to mount and their weight is less. »

— This wording was adopted.

#### *Summary No. 5 :*

5. Supercharging of Diesel engines (provided the design is suitable), and in particular of 4-stroke engines of medium and relatively high rating, may be recommended for the reason that a notable increase in power — up to 50 % — may be obtained at the cost of a relatively modest increase in load and thermal strain.

A discussion took place between Mr. MAASS (*South African Railways*), Messrs. C. MARTIN and GAEBLER on the amount of increased power provided by supercharging.

The figure mentioned (50%), was taken from the information provided by the Administrations and represented the average value at present achieved with motors in the higher power ranges.

It was, therefore, agreed to retain the existing text with the modification shown in the following :

« 5. Supercharging of Diesel engines (provided the design is suitable), and in particular of 4-stroke engines of medium and relatively high rating, may be recommended for the reason that a notable increase in power — up to 50% in the higher power ranges — may be obtained at the cost of a relatively modest increase in load and thermal strain. »

— Approved.

#### *Summary No. 6 :*

6. It is generally preferable to use 4-stroke engines, because the benefits derived from supercharging are more effective with this engine design.

Messrs. DA CUNHA MONTEIRO (*Portuguese Railways*) and BOULANGER considered that this summary raised the



question of a comparison between 2-stroke and 4-stroke engines, which is not appropriate.

The PRESIDENT and Mr. GAEBLER stressed that it arose naturally from the information supplied by the Administrations.

Mr. C. MARTIN asked if it were necessary to stress the advantages of supercharging 4-stroke engines.

Mr. GAEBLER and Mr. TOURNEUR thought that supercharging of 2-stroke engines was more difficult and it was right to note this.

To take into account the various observations made, the summary was amended as follows :

« 6. Present experience shows that preference is generally given to 4-stroke engines which more easily permit the advantages of supercharging to be applied. »

Mr. BOULANGER considered that before proceeding to Summary No. 7 he should mention that there was no summary dealing with Diesel engine cooling.

The PRESIDENT considered that in this connection Summary No. 11 could be extended to include the question of water cooling.

#### *Summary No. 7 :*

7. The underfloor arrangement of the tractive power equipment should be used for small to medium ratings, as it provides more space for the payload in the car body.

Accessibility of the underfloor power unit is of great importance, but this can be arranged without difficulties.

The tractive power equipment of medium to high rating may be installed either in the bogie or in the car body. Installation in the bogie offers the advantage of facilitating the exchange of the entire power unit, inclusive of its bogie, whilst the installation in the car body insures a better accessibility of the power unit even in operation.

The protection of the power unit against bad weather conditions and dirt, as well as a more efficient noise insulation are more easily realized with the installation of the engine in the car body.

This summary gave rise to a long discussion between the PRESIDENT and Messrs. C. MARTIN, STAGNI (*Ministry of Transport, Italy*), GAEBLER, ALSTRÖM and MAASS.

The discussion dealt mainly with the general accessibility of the engine and the possibility of locating it under the body, taking account of a floor height which might be necessitated by operating conditions.

To take account of the remarks made, it was decided to submit a revised text at the next meeting.

#### *Summary No. 8 :*

8. The following transmission systems are suitable :

- (a) mechanical or hydraulic transmissions, or combinations of the two systems, for low power ratings;
- (b) mechanical or hydraulic transmissions for medium power ratings; the superiority of the hydraulic transmission rises in proportion with the increase in power output; the electric transmission becomes feasible as the power rating approaches the upper range of this category;
- (c) hydraulic or electric transmissions exclusively for high power ratings.

Mr. BOULANGER requested that in conformity with the terminology adopted

by the O.R.E., sub-paragraph (a) should read :

« (a) Mechanical, hydro-mechanical or hydraulic transmissions... » and that hydro-mechanical transmissions should also be included in sub-paragraph (b).

This conclusion was, however, amended in the light of discussions on Summary No. 9 and a revised text would be submitted at the next meeting.

#### *Summary No. 9 :*

9. The position of the power unit (Diesel engine with its transmission) in the railcar is influenced by :

- (a) type and location of the Diesel engine, and
- (b) choice of transmission system.

Both the mechanical and hydraulic transmissions require a more restricted layout of engine, transmission, and driving axles.

The electric transmission on the other hand, allows greater freedom in the arrangement of the power unit with its generator and the axle drives (traction motors).

Mr. ALSTRÖM considered that it was necessary in each summary to examine the method of transmission of power to axle, particularly as regards the effect on adhesion.

After an exchange of views between the PRESIDENT, MESSRS. GAEBLER and TOURNEUR it was agreed that the text should be revised.

Mr. IVANOV (*U.S.S.R. Railway Transport Ministry and Vice-President*), thought it was essential to assess the comparative advantages of the various types of transmission.

Despite the interest of this question, which could itself form the subject of a question, it was decided to confine the summary to a very brief mention which would be included in Summary No. 8.

#### *Summary No. 10 :*

10. In order to ensure the proper functioning of the power unit in operation and to enable suitable measures to be taken in the event of a breakdown, the installation of suitable supervisory instruments to be watched by the driver or of automatic control apparatus is to be recommended, covering for instance, the engine coolant temperature, engine coolant reserve, oil pressure, and oil temperature.

Automatic control has the advantage that it :

- (a) is continuous so that it becomes immediately operative in case of failure, and
- (b) leaves the driver free for the performance of his other duties as they relate to train operation, etc.

Its drawback is a somewhat higher expenditure for first cost and maintenance.

Traction power installations of high rating, which are necessarily expensive, warrant the installation of automatic control apparatus.

Alarm apparatus or indicators of a more simple design should prove adequate for less costly power equipment operating under less exacting conditions.

MESSRS. MAASS and DA CUNHA MONTEIRO were of the opinion that the driver should have a minimum of indicating equipment to watch to avoid any relaxation of vigilance.

Mr. GAEBLER agreed with this opinion and mentioned the advantage of completely automatic control.

— The text of this summary would be modified accordingly.

#### *Summary No. 11 :*

11. Water-cooled Diesel engines make protective measure of the cooling system advisable against :

- (a) corrosion and erosion;
- (b) scale formation and incrustation;
- (c) freezing during the cold season.

Mr. GAEBLER recalled that it was necessary to take account of the remarks made earlier by Mr. BOULANGER regarding cooling. He would accordingly submit a supplementary text.

Mr. MAASS stated that he would like a mention made of treated water.

After discussion between Messrs. MAAS, GAEBLER, COLLINS (*Coras Iompair Eireann*) and C. MARTIN it was agreed that water treatment was only one aspect of the question. It was decided, therefore, to retain the original text, completed by an additional paragraph which will be submitted to the Assembly during the next meeting.

#### *Summary No. 12 :*

12. For hydraulic transmissions with coupling characteristics and for mechanical transmissions, the inclusion of a protective device for the engine against overspeeding through torque exerted by the driving axles is to be recommended.

— This summary was adopted without alteration.

#### *Summary No. 13 :*

13. The driving position(s) of Diesel railcars and their control trailers, if any, and of multiple-unit sets, respectively, should be arranged in such a manner that :

- (a) a good visibility is ensured;
- (b) the travelling direction may be reserved without turning the vehicle.

These conditions are most satisfactorily fulfilled with the driving position(s) arranged at the end of the vehicle.

But the provision of a single driving position at a high enough level either at one of the ends or at about the centre of the railcar also ensures a satisfactorily visibility, even if a trailer is running ahead of the motor unit, provided the vehicles are not excessively long.

High-level end-driving positions can afford greater safety to the driving staff, especially in such cases where part of the power unit is built into the car body immediately in front of the driving position at the level at which an impact with possible obstacles on the track might occur.

Care should be taken in the design of the driving position to ensure that the driver is protected from eye strain due to the inclusion in his line of vision of the track passing directly beneath his eyes.

The provision of a driving position at each end of the set suffices for twin or multiple-unit sets, the components of which are never used separately.

Mr. Tournour proposed that the word « can » in the first line of the fourth paragraph should be deleted and the text was therefore agreed as follows :

« 13. The driving position(s) of Diesel railcars and their control trailers, if any, and of multiple-unit sets, respectively, should be arranged in such a manner that :

« (a) a good visibility is ensured;

« (b) the travelling direction may be reversed without turning the vehicle.

« These conditions are most satisfactorily fulfilled with the driving position(s) arranged at the end of the vehicle.

« But the provision of a single driving position at a high enough level either at one of the ends or at about the centre of the railcar also ensures a satisfactory visibility, even if a trailer is running ahead of the motor unit, provided the vehicles are not excessively long.

« Where two cabs are provided, high-level positions afford greater safety to the driving staff, especially in such cases where part of the power unit is built into the car body immediately in front of the driving position at the level at which an



impact with possible obstacles on the track might occur.

« Care should be taken in the design of the driving position to ensure that the driver is protected from eye strain due to the inclusion in his line of vision of the track passing directly beneath his eyes.

« The provision of a driving position at each end of the set suffices for twin or multiple-unit sets, the components of which are never used separately. »

The PRESIDENT thanked the members for their attention and stated that the discussions would be continued at 9,30 a.m., on Wednesday 1st October.

#### Meeting of the 1st October 1958.

The PRESIDENT offered for discussion the revised texts of Summaries Nos. 7, 8, 9, 10 and 11, suggested during the meeting on the 30th September.

#### Summary No. 7 :

Mr. GAEBLER, *Special Reporter*, read the new text :

Mr. ALSTRÖM (S.J.) signified his agreement with the new text which took account of his observations.

Mr. C. MARTIN asked an indication to be given of the maximum power which could be located under the floor. In agreement with Mr. CUTTICA (*Italian State Railways*), who stressed the advantage of the floor level being as low as possible, he proposed an amendment to the relative paragraph to give a more general application. This was *adopted*.

Mr. ABDEL SALAM (*Egyptian Republic Railways*), asked for special mention to be made of protection against dust and also that the maximum power of 500 HP quoted for underfloor engines should be related to high-speed engines.

After discussion between the PRESIDENT, Messrs. GAEBLER, CUTTICA and DA CUNHA MONTEIRO, it was agreed to accept these two points.

The final text is shown hereafter :

« 7. In the design of a vehicle, particular importance should be attached to accessibility of the power equipment.

« The underfloor arrangement of the latter can be used for small to medium ratings (up to about 500 HP with high-speed engines) and provides the advantage of more space for pay load in the car body. Where it is desirable to have a particularly low level floor, however, space may not be available to permit such arrangement.

« The tractive power equipment of medium to high rating may be installed either in the bogie or in the car body.

« Installation in the bogie offers the advantage of facilitating the exchange of the entire power unit, inclusive of its bogie, but accessibility is more easily attained, even in operation, by installation in the car body.

« The protection of the power unit against bad weather conditions, and dust as well as a more efficient noise insulation are more easily realised with the installation of the engine in the car body. »

— Adopted.

*Summary No. 8 :*

The PRESIDENT explained the great difficulties which existed in formulating a brief comparison of the various transmissions and asked if it was desirable to maintain the original text. However, he called upon Mr. GAEBLER to read the new alternative text.

Mr. ABDEL SALAM considered that there was no question of using mechanical transmissions in multiple working, even at low powers, Messrs. TOURNEUR and STAGNI did not agree, having regard to experience on their railways.

After an exchange of views, the PRESIDENT, Mr. C. MARTIN, who preferred the original text, and Mr. IVANOV to whom the new text seemed more complete and was satisfactory, it was decided to adopt the latter.

Mr. ALSTRÖM called attention to a minor disagreement in the French and English texts, and the latter was amended accordingly.

The agreed text is reproduced hereafter :

« 8. The following transmission systems are in use :

« (a) mechanical, hydro-mechanical or hydraulic transmissions for low power ratings. The mechanical transmission has better efficiency. Its drawback is that vehicle speed and engine speed are related in a fixed manner in each gear. Therefore, any equipment having a mechanical gear must have an efficient friction clutch which will compensate for the speed difference between engine shaft and driving shaft during the starting period.

« In more recent times, mechanical gear with hydraulic couplings ahead of them have also been frequently used for this purpose.

« (b) because of increasing construction difficulties with friction clutches as power increases, mechanical gears with hydraulic converters ahead of them, or hydraulic transmission are used for medium up to higher power ratings. Towards the top of the medium range, electric transmissions are in service.

« (c) hydraulic or electric transmissions exclusively for high power ratings. At the present time, both systems have been giving satisfactory results in service even for higher output. They are practically equivalent as regards their efficiency.

« The advantages of hydraulic transmission in the starting period have to be compared with the advantages of electric transmission as regards regulation, particularly in the part load range.

« The question as to which system is to be preferred depends, apart from the operating conditions, on the availability from industry of suitable proved types for the vehicle under design ».

*Summary No. 9 :*

Mr. GAEBLER read the new text.

Mr. TOURNEUR preferred the original text, which he thought was clearer. It was agreed to accept the original text, worded as follows :

« 9. The position of the power unit (Diesel engine with its transmission) in the railcar is influenced by :

« (a) type and location of the Diesel engine, and

« (b) choice of transmission system.

« Both the mechanical and hydraulic transmissions require a more restricted layout of engine, transmission, and driving axles.

« The electric transmission, on the other hand, allows greater freedom in the arrangement of the power unit with its generator and the axle drives (traction motors).

*Summary No. 10 :*

Mr. GAEBLER read the revised text.

After discussion between Messrs. MAASS, C. MARTIN, BOULANGER and GAEBLER, regarding the last paragraph, it was pointed out that this applied to equipment provided for automatic control and that the mention of driver's instruments should be taken out.

Mr. ALSTRÖM asked if the expression « fail to safety » in the third paragraph corresponded to the French terms : « dans le sens de la sécurité ».

Mr. SYKES (*British Railways*), replied that this was the case.

The agreed text is reproduced hereafter :

« 10. In order to ensure the proper functioning of the power unit in operation and to enable suitable measures to be taken in the event of a breakdown in service, the installation of suitable supervisory instruments to be watched by the driver or of automatic control apparatus is to be recommended, covering for instance, the engine coolant temperature, engine coolant reserve, oil pressure and oil temperature.

« Any automatic supervisory equipment should function on the « fail to safety » principle in order to ensure that in case of any failure the equipment under supervision will be switched off. Indicator lamps locating failures should be provided, not on the driver's panel, but in the neighbourhood of the machinery to which they refer.

« Automatic control has the advantage that it :

« (a) is continuous so that it becomes immediately operative in case of failure, and

« (b) leaves the driver free for the performance of his other duties as they relate to train operation, etc.

« Its drawback is a somewhat higher expenditure for first cost and maintenance.

« Traction power installations of high rating, which are necessarily expensive, warrant the installation of automatic control apparatus.

« Alarm apparatus or indicators of a more simple design should prove adequate for less costly power equipment operating under less exacting conditions.

« In the case of automatic control, the indicators provided on the driver's panel should be kept to a minimum, and so far as possible, should consist only of those indicators required to assist him in the operation of the train. A single warning indicator may be provided to cover failure of the power equipment. »

*Summary No. 11 :*

Mr. GAEBLER read the new text.

Mr. TOURNEUR asked if there were in existence railcars with air-cooled motors.



Messrs. BOULANGER, ABDEL SALAM, ALSTRÖM and GAEBLER gave some examples of such vehicles.

The new text was adopted as follows :

« 11. Water cooling of engine has been of general practice up to the present. It is known that air cooling has been used in a limited number of cases in the lower power engines.

« Water-cooled Diesel engines make protective measure of the cooling system advisable against :

- « (a) corrosion and erosion;
- « (b) scale formation and incrustation;
- « (c) freezing during the cold season. »

Consideration was then given to summaries which had not previously been discussed.

#### *Summary No. 14 :*

14. In railcars used under simplified conditions, with a single power unit and not required to run jointly with a control trailer or other motor units, direct mechanical control of the power unit and its auxiliary is possible and adequate. This type of control is reliable and economical to purchase and maintain, because of its simple construction.

On the other hand, railcars to be used jointly with a control trailer or other motor units should be equipped with remote control, unless the cost of the staff needed to attend two or more power units represents a smaller money outlay than the building, operation, and maintenance of multiple control equipment.

In designing for a strictly limited combination of power units, a relatively simple and inexpensive multiple control may be provided.

When the traffic requirements involve the use of a larger number of power units, operated together by a single driver, a multiple control system in conjunction with fully automatic control of power units, as described in item 10, is necessary.

Mr. MAASS asked for an explanation of the expression « simplified conditions ». Mr. GAEBLER replied that by this he meant operating conditions on secondary lines without very exacting traffic demands.

Mr. ALSTRÖM stated that for standardisation, and even at some extra initial cost, it was necessary to aim at a stock of railcars capable of working over all lines, and suggested an addition to this effect.

The PRESIDENT and Mr. GAEBLER recalled that this question was dealt with in Summary No. 2.

Following an intervention by Mr. BOULANGER, a discussion took place between Messrs. GAEBLER, COLLINS and DA CUNHA MONTEIRO on the interpretation to be placed on the last 2 paragraphs. Also joining in the discussion, Mr. TOURNEUR proposed that to clarify the text a mention should be introduced at the beginning of the last paragraph to refer to the working of twin-units. This was *adopted*.

At the suggestion of Mr. ALSTRÖM the word « control » in the penultimate line of the English text was replaced by « supervision. »

The final text is given hereafter :

« 14. In railcars used under simplified conditions, with a single power unit and not required to run jointly with a control trailer or other motor units, direct mechanical control of the power unit and its auxiliary is possible and adequate. This type of control is reliable and economical to purchase and maintain, because of its simple construction.

« On the other hand, railcars to be used jointly with a control trailer or other

motor units should be equipped with remote control, unless the cost of the staff needed to attend two or more power units represents a smaller money outlay than the building, operation and maintenance of multiple control equipment.

« In designing for a strictly limited combination of power units e.g. a twin unit, a relatively simple and inexpensive multiple control may be provided.

« When the traffic requirements involve the use of a larger number of power units, operated together by a single driver, a multiple control system in conjunction with fully automatic supervision of power units, as described in item 10, is necessary.»

#### *Summary No. 15 :*

15. One of the determining factors of economic operation of Diesel railcars is the structural weight, as it influences :

- (a) the determination of required power output;
- (b) the fuel consumption;
- (c) the extent of wear and tear (in particular of the running gear components and brakes), and consequently, the extent of repair costs;
- (d) the purchase price.

This makes it advisable to limit the weight to an economically tolerable minimum value.

Efforts to effect weight savings should extend to all components of the railcars and their trailers and control trailers, wherever this can be achieved without impairing the safety of passengers, reducing travelling comfort to any noticeable extent or incurring liability of heavy maintenance and renewal costs.

A reasonable additional charge incurred by increased expenditures for design and materials as a consequence of an intensified light-weight construction may be tolerated to a certain extent, in view of the expected savings.

Construction methods recommended to effect weight savings are :

- (a) light-weight construction in steel with extensive welding;
- (b) combined steel and light alloy construction;
- (c) application of light metals and their alloys and plastics;
- (d) utilization of light-weight mechanical equipment and other fittings.

Mr. KOSTER (*Netherlands Railways*), proposed the replacement in paragraph (c) of the word « repair » by « maintenance ». This was *agreed*.

He also asked for greater prominence to be given to the question of passenger safety in the restriction of weight.

With regard to the types of construction recommended in connection with weight reduction, Mr. ABDEL SALAM asked that mention be made of tubular construction and Mr. ATHANASSOV (*Ministry of Transport and Communications, Bulgaria*), asked for new types of suspension. This was *agreed*.

After discussion between Messrs. COLLINS, CUTTICA and GAEBLER on the question of retaining point (d) it was decided that this could be retained and the opening words amended to read « it is... ».

The final text is given below :

« 15. One of the determining factors of economic operation of Diesel railcars is the structural weight, as it influences :

- « (a) the determination of required power output;
- « (b) the fuel consumption;
- « (c) the extent of wear and tear (in particular of the running gear components and brakes), and consequently, the extent of maintenance costs.
- « (d) the purchase price.

« It is advisable to limit the weight — without impairing the safety of passengers, reducing travelling comfort to any noticeable extent or incurring liability of heavy maintenance and renewal costs — to an economically tolerable minimum value.

« Efforts to effect weight savings should extend to all components of the railcars and their trailers and control trailers.

« A reasonable additional charge incurred by increased expenditure for design and materials as a consequence of an intensified lightweight construction may be tolerated to a certain extent, in view of the expected savings.

« Construction methods recommended to effect weight savings are :

« (a) use of cellular or tubular methods of construction;

« (b) light-weight construction in steel with extensive welding;

« (c) combined steel and light alloy construction;

« (d) application of light metals and their alloys and plastics;

« (e) utilization of light-weight mechanical equipment and other fittings;

« (f) use of new types of suspension. »

#### *Summary No. 16 :*

16. At the designing stage of Diesel railcars, the following measures suitable to enhance travelling comfort should receive careful attention :

(a) *Insulation against noise and vibrations* involving, so far as the car body is concerned :

— prevention of drumming;

— absorption of noise;

— insulation against noise including the avoidance of openings admitting noise in the car body. When openings are un-

avoidable, they should be carefully sealed to prevent noise from reaching passenger accommodation;

and relating to the engine and its auxiliaries :

— insulation against noise and vibrations produced by the traction power equipment.

A certain increase of the weight of the vehicle caused by insulation requirements is justified.

(b) *Heating.* — The following systems may be recommended for the heating of railcars, trailers, and control trailers :

— hot air heating;

— hot water heating;

— steam heating;

— electric heating.

Where a hot air or hot water heating system is used in the railcar itself, it is advisable, for the sake of power economy, to make use of the waste heat of the engine coolant. The additional insertion of a heat generator in the heating circuit is to be recommended, permitting pre-heating of the engine coolant and passenger accommodation before going on duty; these systems also allow keeping both the engine and passenger accommodation warm, if there are operating interruptions of long duration.

Steam heating systems should be applied only if railcars are to be operated jointly with standard passenger carriages equipped with steam heating.

The additional expense of electric heating is supportable where Diesel-sets are required with a high standard of comfort.

Heating systems which make direct use of the heat of waste gases, cannot be recommended for the disadvantages inherent in such systems.

It is especially important that the heating system used provides for a satisfactory regulation of heat and is quickly responsive to regulator settings.

(c) *Ventilation.* — The ventilation of railcars used under ordinary conditions should be effected by opening windows and the provision of static suction ventilators on the roof; for services with a higher standard of comfort, the installation of electric fans may be envisaged.



Hot air heating systems should be designed in combination with the ventilation of the car interior.

It is self-evident that, except for countries with an unusually hot climate and subject to dust conditions, and apart from vehicles offering a rather high standard of comfort, the provision of an air-conditioning plant is prohibitive on account of its high cost and additional weight. Where such an installation is included, it is recommended that it should have its energy supply provided by a separate generator, driven by an auxiliary Diesel engine.

(d) *Gangways*. — If the kind of service provided supports the additional expenditure, it is advisable to provide gangways for the passengers between the individual railcars in a set, designed as:

- gangway floor plates, normally for the use of railway staff only;
- gangways with bellows of various designs as a protection for passengers against weather conditions and for safety and other reasons where a certain degree of comfort applies to the vehicles.

(e) *Running gear*. — The running gear should be designed to ensure an optimum of riding stability, even with an average state of maintenance of the permanent way.

With the exception of the most simple designs, bogies should be used in the running gear.

As a additional means to improve riding stability, one or more of the following devices should receive careful attention:

- coil springs or torsion bars, practically without self-damping, for the secondary and primary suspension, together with hydraulic shock-absorbers; special care must be taken to counterbalance the natural frequency of vibration of the various suspension systems;
- self-damping springs of rubber or combined designs of steel and rubber;
- guide bars between axle-boxes and bogie frames, instead of the ordinary axle-boxes sliding in the horn guides, to eliminate the play in the longitudinal and transverse axes and to avoid wear and tear;
- locating the bogie pivot at the lowest practicable level.

Air spring systems, as well as any other design of springs with a gas or vapour chamber, have thus far seen little use in the design of railway vehicles, so that experience with this type of suspension is still lacking. However, it may be opportune to study the applicability of such systems, especially in view of the fact that the tendency is unmistakably in the direction of light-weight construction. With this type of construction, the value of the inherent possibility of these systems to ensure an automatic adaptation of characteristics to widely fluctuating loading conditions is obvious. These new systems may show the way towards genuine improvements; several experimental vehicles are already in use.

Mr. ABDEL SALAM stated that in the whole of the summaries there was no mention of measures taken to provide protection against fire. He considered that this very important point should be included in order that the report as a whole should cover the complete design of railcars.

Mr. GAEBLER mentioned that this point, which he recognised to be of great importance, had not been included in the questionnaire addressed to the Administrations and that in the time left it was practically impossible to deal with such a subject. Moreover, this concerns only one particular type of vehicle and protection against fire applied to all railway rolling stock.

Mr. ABDEL SALAM pressed the increased danger in railcars compared with other types of stock.

Mr. TOURNEUR then proposed the addition of a summary No. 18 which would deal with the basic necessity for protection against fire in the design of railcars. This was *agreed*.

Mr. C. MARTIN asked that he be allowed to emphasise that existing stock as designed by the constructors did, in fact, almost eliminate the threat of fire.

Mr. JONKER (*Netherlands Railways*), referring to paragraph (b) on *Heating*, proposed a mention of the additional heating equipment which could also come into operation during periods of working at low powers. This was *agreed*.

The final text is given below :

« 16. At the designing stage of Diesel railcars, the following measures suitable to enhance travelling comfort should receive careful attention :

(a) *Insulation against noise and vibrations* involving, so far as the car body is concerned :

« — prevention of drumming;

« — absorption of noise;

« — insulation against noise including the avoidance of openings admitting noise in the car body. When openings are unavoidable, they should be carefully sealed to prevent noise from reaching passenger accommodation;

« and relating to the engine and its auxiliaries :

« — insulation against noise and vibrations produced by the traction power equipment.

« A certain increase of the weight of the vehicle caused by insulation requirements is justified.

« (b) *Heating*. — The following systems may be recommended for the heat-

ing of railcars, trailers, and control trailers :

« — hot air heating;

« — hot water heating;

« — steam heating;

« — electric heating.

« Where a hot air or hot water heating system is used in the railcar itself, it is advisable, for the sake of power economy, to make use of the waste heat of the engine coolant. The additional insertion of a heat generator in the heating circuit is to be recommended, permitting pre-heating of the engine coolant and passenger accommodation before going on duty; these systems also allow keeping both the engine and passenger accommodation warm, if there are operating interruptions of long duration; and when the vehicle is working at reduced power.

« Steam heating systems should be applied only if railcars are to be operated jointly with standard passenger carriages equipped with steam heating.

« The additional expense of electric heating is supportable where Diesel-sets are required with a high standard of comfort.

« Heating systems which make direct use of the heat of waste gases, cannot be recommended for the disadvantages inherent in such systems.

« It is especially important that the heating system used provides for a satisfactory regulation of heat and is quickly responsive to regulator settings.

« (c) *Ventilation*. — The ventilation of railcars used under ordinary conditions should be effected by opening windows and the provision of static suction ventila-

ators on the roof; for services with a higher standard of comfort, the installation of electric fans may be envisaged.

« Hot air heating systems should be designed in combination with the ventilation of the car interior.

« It is self-evident that, except for countries with an unusually hot climate and subject to dust conditions, and apart from vehicles offering a rather high standard of comfort, the provision of an air-conditioning plant is prohibitive on account of its high cost and additional weight. Where such an installation is included, it is recommended that it should have its energy supply provided by a separate generator, driven by an auxiliary Diesel engine.

« (d) *Gangways*. — If the kind of service provided supports the additional expenditure, it is advisable to provide gangways for the passengers between the individual railcars in a set, designed as :

« — gangway floor plates, normally for the use of railway staff only;

« — gangways with bellows of various designs as a protection for passengers against weather conditions and for safety and other reasons where a certain degree of comfort applies to the vehicles.

(e) *Running gear*. — The running gear should be designed to ensure an optimum of riding stability, even with an average state of maintenance of the permanent way.

With the exception of the most simple designs, bogies should be used in the running gear.

As an additional means to improve riding stability, one or more of the

following devices should receive careful attention :

« — coil springs or torsion bars, practically without self-damping, for the secondary and primary suspension, together with hydraulic shock-absorbers : special care must be taken to counter-balance the natural frequency of vibration of the various suspension systems;

« — self-damping springs of rubber or combined designs of steel and rubber;

« — guide bars between axle-boxes and bogie frames, instead of the ordinary axle-boxes sliding in the horn guides, to eliminate the play in the longitudinal and transverse axes and to avoid wear and tear;

« — locating the bogie pivot at the lowest practicable level.

« Air spring systems, as well as any other design of springs with a gas or vapour chamber have thus so far seen little use in the design of railway vehicles, so that experience with this type of suspension is still lacking. However, it may be opportune to study the applicability of such systems, especially in view of the fact that the tendency is unmistakably in the direction of light-weight construction. With this type of construction the value of the inherent possibility of these systems to ensure an automatic adaptation of characteristics to widely fluctuating loading conditions is obvious. These new systems may show the way towards genuine improvements; several experimental vehicles are already in use.

#### *Summary No. 17 :*

##### *17. Buffer and traction gear.*

If the possibility has to be envisaged that passenger coaches and goods wagons equip-



ped with the ordinary buffing and draw gear may have to be hauled by railcars, the latter must be equipped similarly. In this event, it suffices, however, to employ a lighter design of such buffer and traction gear, as the loads to be hauled will be light.

Where no such possibility has to be taken into consideration, automatic centre couplings may be used as standard equipment for railcars and their trailers. They are especially advantageous in services requiring quick coupling and uncoupling of units en route.

The automatic centre coupling may be designed to ensure automatic coupling of the brake air line and multiple control circuits.

— This summary was adopted without alteration.

#### *Summary No. 18 :*

An additional summary to meet the remarks made by Mr. ABDEL SALAM regarding fire protection was adopted in the terms proposed by Mr. TOURNEUR.

The text of this summary is given hereafter :

« 18. Fire protection is an important factor in passenger and rolling stock safety. The effectiveness of the measures taken for this purpose are implicit in the arrangements provided in the construction. »

This concluded the examination of Question No. 3. The PRESIDENT thanked the delegates present for their assistance and the meeting closed at 12.45 p.m.

The complete text of the summaries adopted is reproduced hereafter :

### **SUMMARIES.**

« 1. The number of types of different « designs of Diesel railcars should be « limited as far as practicable. The

« economy of railcar operations im-  
« proves with the number of completely  
« identical units in service in the area  
« of the Administration.

« 2. Whilst it may be necessary, for  
« reasons of traffic requirements, to  
« provide various types of interior arran-  
« gements and equipment, all efforts  
« should be made to maintain unifor-  
« mity of design, as relating to the most  
« important components subject to wear  
« and tear (as, for instance, traction  
« power equipment, auxiliary machinery,  
« running gear, brakes, buffing and draw  
« gear, as well as certain details, such  
« as doors, windows, etc.).

« 3. The installation of a single trac-  
« tion power unit (Diesel engine plus its  
« transmission) in each motor unit is  
« the more economical method, if suit-  
« able equipment with the necessary  
« power output is available on the  
« market.

« The installation of two separate  
« units, for reasons of operating relia-  
« bility, is no longer necessary, in view  
« of the present high standard of design  
« and manufacturing technique.

« A subdivision of the total power  
« output in two separate units may be  
« opportune for the following reasons :

« (a) Limitation of types of mechan-  
« ical equipment in use;

« (b) To permit the utilization of  
« engines and/or transmissions available  
« from mass production of the motor  
« vehicle industry, thus benefiting by the  
« relatively low first cost and main-  
« tenance charges for spare parts.

« A division of the power unit in two

« may also become inevitable, if power  
« requirements make the installation of  
« a single unit impracticable.

« 4. High speed Diesel engines are, as  
« a general rule, preferable for use in  
« Diesel railcars because their dimen-  
« sions are smaller, they are easier to  
« mount and their weight is less.

« 5. Supercharging of Diesel engines  
« (provided the design is suitable), and  
« in particular of 4-stroke engines of  
« medium and relatively high rating, may  
« be recommended for the reason that  
« a notable increase in power — up to  
« 50 % in the higher power ranges —  
« may be obtained at the cost of a rela-  
« tively modest increase in load and  
« thermal strain.

« 6. Present experience shows that  
« preference is generally given to  
« 4-stroke engines which more easily  
« permit the advantages of supercharg-  
« ing to be applied.

« 7. In the design of a vehicle, par-  
« ticular importance should be attached  
« to accessibility of the power equip-  
« ment.

« The underfloor arrangement of the  
« latter can be used for small to medium  
« ratings (up to about 500 HP with  
« high-speed engines) and provides the  
« advantage of more space for pay load  
« in the car body. Where it is desir-  
« able to have a particularly low level  
« floor, however, space may not be  
« available to permit such arrangement.

« The tractive power equipment of  
« medium to high rating may be installed  
« either in the bogie or in the car body.

« Installation in the bogie offers the  
« advantage of facilitating the exchange  
« of the entire power unit, inclusive of  
« its bogie, but accessibility is more  
« easily attained, even in operation, by  
« installation in the car body.

« The protection of the power unit  
« against bad weather conditions, and  
« dust as well as a more efficient noise  
« insulation are more easily realised  
« with the installation of the engine in  
« the car body.

« 8. The following transmission sys-  
« tems are in use :

« (a) mechanical, hydro-mechanical  
« or hydraulic transmissions for low  
« power ratings. The mechanical trans-  
« mission has better efficiency. Its  
« drawback is that vehicle speed and  
« engine speed are related in a fixed  
« manner in each gear. Therefore, any  
« equipment having a mechanical gear  
« must have an efficient friction clutch  
« which will compensate for the speed  
« difference between engine shaft and  
« driving shaft during the starting period.

« In more recent times, mechanical  
« gear with hydraulic couplings ahead  
« of them have also been frequently used  
« for this purpose.

« (b) because of increasing construc-  
« tion difficulties with friction clutches  
« as power increases, mechanical gears  
« with hydraulic converters ahead of  
« them, or hydraulic transmission are  
« used for medium up to higher power  
« ratings. Towards the top of the me-  
« dium range, electric transmissions are  
« in service.

« (c) hydraulic or electric transmis-  
« sions exclusively for high power rat-

« ings. At the present time, both systems have been giving satisfactory results in service even for higher output. They are practically equivalent as regards their efficiency. The advantages of hydraulic transmission in the starting period have to be compared with the advantages of electric transmission as regards regulation, particularly in the part load range. The question as to which system is to be preferred depends, apart from the operating conditions, on the availability from industry of suitable proved types for the vehicle under design.

« 9. The position of the power unit (Diesel engine with its transmission) in the railcar is influenced by :

« (a) type and location of the Diesel engine, and

« (b) choice of transmission system.

« Both the mechanical and hydraulic transmissions require a more restricted layout of engine, transmission, and driving axles.

« The electric transmission on the other hand, allows greater freedom in the arrangement of the power unit with its generator and the axle drives (traction motors).

« 10. In order to ensure the proper functioning of the power unit in operation and to enable suitable measures to be taken in the event of a breakdown in service, the installation of suitable supervisory instruments to be watched by the driver or of automatic control apparatus is to be recommended, covering for instance, the engine coolant temperature, engine

« coolant reserve, oil pressure and oil temperature.

« Any automatic supervisory equipment should function on the « fail to safety » principle in order to ensure that in case of any failure the equipment under supervision will be switched off. Indicator lamps locating failures should be provided, not on the driver's panel, but in the neighbourhood of the machinery to which they refer.

« Automatic control has the advantage that it :

« (a) is continuous so that it becomes immediately operative in case of failure, and

« (b) leaves the driver free for the performance of his other duties as they relate to train operation, etc.

« Its drawback is a somewhat higher expenditure for first cost and maintenance.

« Traction power installations of high rating, which are necessarily expensive, warrant the installations of automatic control apparatus.

« Alarm apparatus or indicators of a more simple design should prove adequate for less costly power equipment operating under less exacting conditions.

« In the case of automatic control, the indicators provided on the driver's panel should be kept to a minimum, and so far as possible, should consist only of those indicators required to assist him in the operation of the train. A single warning indicator may be provided to cover failure of the power equipment.



« 11. Water cooling of engine has  
« been of general practice up to the pre-  
« sent. It is known that air cooling has  
« been used in a limited number of cases  
« in the lower power engines.

« Water-cooled Diesel engines make  
« protective measure of the cooling sys-  
« tem advisable against :

- « (a) corrosion and erosion;
- « (b) scale formation and incrustation;
- « (c) freezing during the cold season.

« 12. For hydraulic transmissions with  
« coupling characteristics and for me-  
« chanical transmissions, the inclusion  
« of a protective device for the engine  
« against overspeeding through torque  
« exerted by the driving axles is to be  
« recommended.

« 13. The driving position(s) of Die-  
« sel railcars and their control trailers,  
« if any, and of multiple-unit sets, res-  
« pectively, should be arranged in such  
« a manner that :

- « (a) a good visibility is ensured;
- « (b) the travelling direction may be  
« reversed without turning the vehicle.

« These conditions are most satis-  
« factorily fulfilled with the driving posi-  
« tion(s) arranged at the end of the  
« vehicle.

« But the provision of a single driv-  
« ing position at a high enough level  
« either at one of the ends or at about  
« the centre of the railcar also ensures a  
« satisfactory visibility, even if a trailer  
« is running ahead of the motor unit,  
« provided the vehicles are not excessi-  
« vely long.

« Where two cabs are provided, high-

« level positions afford greater safety  
« to the driving staff, especially in such  
« cases where part of the power unit is  
« built into the car body immediately  
« in front of the driving position at the  
« level at which an impact with possible  
« obstacles on the track might occur.

« Care should be taken in the design  
« of the driving position to ensure that  
« the driver is protected from eye strain  
« due to the inclusion in his line of  
« vision of the track passing directly  
« beneath his eyes.

« The provision of a driving position  
« at each end of the set suffices for twin  
« or multiple-unit sets, the components  
« of which are never used separately.

« 14. In railcars used under simpli-  
« fied conditions, with a single power  
« unit and not required to run jointly  
« with a control trailer or other motor  
« units, direct mechanical control of the  
« power unit and its auxiliary is possible  
« and adequate. This type of control is  
« reliable and economical to purchase  
« and maintain, because of its simple  
« construction.

« On the other hand, railcars to be  
« used jointly with a control trailer or  
« other motor units should be equipped  
« with remote control, unless the cost of  
« the staff needed to attend two or more  
« power units represents a smaller mo-  
« ney outlay than the building, operation  
« and maintenance of multiple control  
« equipment.

« In designing for a strictly limited  
« combination of power units e.g. a twin  
« unit, a relatively simple and inexpen-  
« sive multiple control may be provided.

« When the traffic requirements in-

« involve the use of a larger number of  
« power units, operated together by a  
« single driver, a multiple control system  
« in conjunction with fully automatic  
« supervision of power units, as described in item 10, is necessary.

« 15. One of the determining factors  
« of economic operation of Diesel rail-  
« cars is the structural weight, as it  
« influences :

« (a) the determination of required  
« power output;

« (b) the fuel consumption;

« (c) the extent of wear and tear (in  
« particular of the running gear compo-  
« nents and brakes), and consequently,  
« the extent of maintenance costs;

« (d) the purchase price.

« It is advisable to limit the weight  
« — without impairing the safety of pas-  
« sengers, reducing travelling comfort to  
« any noticeable extent or incurring lia-  
« bility of heavy maintenance and rene-  
« wal costs — to an economically toler-  
« able minimum value.

« Efforts to effect weight savings  
« should extend to all components of  
« the railcars and their trailers and con-  
« trol trailers.

« A reasonable additional charge in-  
« curred by increased expenditure for  
« design and materials as a consequence  
« of an intensified lightweight construc-  
« tion may be tolerated to a certain  
« extent, in view of the expected savings.

« Construction methods recommended  
« to effect weight savings are :

« (a) use of cellular or tubular me-  
« thods of construction;

« (b) light-weight construction in steel  
« with extensive welding;

« (c) combined steel and light alloy  
« construction;

« (d) application of light metals and  
« their alloys and plastics;

« (e) utilization of light-weight me-  
« chanical equipment and other fittings;

« (f) use of new types of suspension.

« 16. At the designing stage of Diesel  
« railcars, the following measures suit-  
« able to enhance travelling comfort  
« should receive careful attention :

« (a) *Insulation against noise and vi-*  
« *brations* involving, so far as the car  
« body is concerned :

« — prevention of drumming;

« — absorption of noise;

« — insulation against noise includ-  
« ing the avoidance of openings admit-  
« ting noise in the car body. When  
« openings are unavoidable, they should  
« be carefully sealed to prevent noise  
« from reaching passenger accommoda-  
« tion;

« and relating to the engine and its  
« auxiliaries :

« — insulation against noise and vi-  
« brations produced by the traction  
« power equipment.

« A certain increase of the weight of  
« the vehicle caused by insulation requi-  
« rements is justified.

« (b) *Heating*. — The following sys-  
« tems may be recommended for the  
« heating of railcars, trailers, and con-  
« trol trailers :

« — hot air heating;

« — hot water heating;

« — steam heating;

« — electric heating.

« Where a hot air or hot water heating system is used in the railcar itself, it is advisable, for the sake of power economy, to make use of the waste heat of the engine coolant. The additional insertion of a heat generator in the heating circuit is to be recommended, permitting pre-heating of the engine coolant and passenger accommodation before going on duty; these systems also allow keeping both the engine and passenger accommodation warm, if there are operating interruptions of long duration; and when the vehicle is working at reduced power.

« Steam heating systems should be applied only if railcars are to be operated jointly with standard passenger carriages equipped with steam heating.

« The additional expense of electric heating is supportable where Diesel sets are required with a high standard of comfort.

« Heating systems which make direct use of the heat of waste gases, cannot be recommended for the disadvantages inherent in such systems.

« It is especially important that the heating system used provides for a satisfactory regulation of heat and is quickly responsive to regulator settings.

« (c) *Ventilation*. — The ventilation of railcars used under ordinary conditions should be effected by opening windows and the provision of static suction ventilators on the roof; for services with a higher standard of com-

« fort, the installation of electric fans may be envisaged.

« Hot air heating systems should be designed in combination with the ventilation of the car interior.

« It is self-evident that, except for countries with an unusually hot climate and subject to dust conditions, and apart from vehicles offering a rather high standard of comfort, the provision of an air-conditioning plant is prohibitive on account of its high cost and additional weight. Where such an installation is included, it is recommended that it should have its energy supply provided by a separate generator, driven by an auxiliary Diesel engine.

« (d) *Gangways*. — If the kind of service provided supports the additional expenditure, it is advisable to provide gangways for the passengers between the individual railcars in a set, designed as :

« — gangway floor plates, normally for the use of railway staff only;

« — gangways with bellows of various designs as a protection for passengers against weather conditions and for safety and other reasons where a certain degree of comfort applies to the vehicles.

« (e) *Running gear*. — The running gear should be designed to ensure an optimum of riding stability, even with an average state of maintenance of the permanent way.

« With the exception of the most simple designs, bogies should be used in the running gear.



« As an additional means to improve  
« riding stability, one or more of the  
« following devices should receive care-  
« ful attention :

« — coil springs or torsion bars,  
« practically self-damping, for the secondary and primary suspension, together  
« with hydraulic shock-absorbers; special  
« care must be taken to counterbalance  
« the natural frequency of vibration of  
« the various suspension systems;

« — self-damping springs of rubber  
« or combined designs of steel and  
« rubber;

« — guide bars between axle-boxes  
« and bogie frames, instead of the ordinary axle-boxes sliding in the horn  
« guides, to eliminate the play in the  
« longitudinal and transverse axes and  
« to avoid wear and tear;

« — locating the bogie pivot at the  
« lowest practicable level.

« Air spring systems, as well as any  
« other design of springs with a gas or  
« vapour chamber, have thus so far seen  
« little use in the design of railway vehicles, so that experience with this  
« type of suspension is still lacking.  
« However, it may be opportune to  
« study the applicability of such systems,  
« especially in view of the fact that the  
« tendency is unmistakably in the direction of light-weight construction. With  
« this type of construction the value of  
« the inherent possibility of these systems to ensure an automatic adaptation  
« of characteristics to widely fluctuating loading conditions is obvious.  
« These new systems may show the way  
« towards genuine improvements; several  
« experimental vehicles are already in  
« use.

#### « 17. *Buffer and traction gear.*

« If the possibility has to be envisaged  
« that passenger coaches and goods  
« wagons equipped with the ordinary  
« buffing and draw gear may have to be  
« hauled by railcars, the latter must be  
« equipped similarly. In this event, it  
« suffices, however, to employ a lighter  
« design of such buffer and traction  
« gear, as the loads to be hauled will be  
« light.

« Where no such possibility has to be  
« taken into consideration, automatic  
« centre couplings may be used as standard equipment for railcars and their  
« trailers. They are especially advantageous in services requiring quick coupling and uncoupling of units en route.

« The automatic centre coupling may  
« be designed to ensure automatic coupling of the brake air line and multiple  
« control circuits.

« 18. Fire protection is an important  
« factor in passenger and rolling stock  
« safety. The effectiveness of the measures taken for this purpose are implicit in the arrangements provided in  
« the construction. »

— These Summaries were ratified by the Plenary Meeting of the 3rd October 1958.

#### QUESTION 4.

Comparative study of the periodical maintenance and repair of electric locomotives, in particular as regards :  
— the wear of the tyres (influence of the wheel diameter, the axle-load, the speed, the type of bogies and eventually undulatory wear of the rails, etc.);

- the maintenance of traction motors and their transmission (flash at the collectors and methods of coping with it, use of roller bearings for the suspension of the motors and the hollow shafts, etc.);
- lubricants used (classical and such new types as bisulphide or molybdenum);
- wear of the friction strips of the pantographs.
- Kind of work and periodicity.
- Organisation of the maintenance and influence of common user (banalisation) of the locomotives.
- Prime cost in relation to the type of equipment and the age of the engines.

#### Preliminary documents.

Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxembourg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Union of Soviet Socialist Republics, Viet-Nam and Yugoslavia), by M. VIANI. (See *Bulletin* for July 1958, p. 1025.)

Report (America [North and South], Australia [Commonwealth of], Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by K. J. Cook. (See *Bulletin* for March 1958, p. 499.)

Supplement to Report, by K. J. Cook. (See *Bulletin* for August 1958, p. 1279.)

Special Report by K. J. Cook. (See *Bulletin* for September 1958, p. 1363.)

#### Report of Section II.

(See the *Congress Daily Journal*, No. 4, p. II; No. 6, p. III and X; No. 7, p. I and VII.)

— The meeting was opened at 9.30 a.m. by the PRESIDENT, Mr. RATTER, who called upon Mr. COOK, *Special Reporter*, who gave a general survey of his special report.

The discussion of the summaries in the report was then opened. To facilitate the discussion, the summaries were considered in numbered passages.

#### Summary No. 1 :

(paragraphs 1 and 2 of Chapter II) :

#### CHAPTER II.

##### Wear of rails and tyres.

The useful life of rails under electric traction is less than with steam traction, the reduction reported ranging from 8 to 50 %. This is not only due to electrification itself, but is also due to the more intensive services which normally accompany electrification.

Flange wear on tyres has been greatly reduced by the provision of track oilers placed at suitable positions at curves or on the locomotives. The reduction of flange wear is of great economic importance as approximately three times the flange wear has to be removed from the tread of the tyre to reform the flange.

Mr. IVANČEVIĆ (*Yugoslavian Railways*), asked what was meant by the « useful life of rails ». He also stated that such life depended on such a large number of factors that the method of traction could become a secondary matter.

Mr. Cook stated that the proposed text reflected the opinions expressed by the Administrations.

Mr. C. MARTIN (*French National Railways*), did not consider that in the case of the S.N.C.F., there was any relationship between the type of traction and the wear of the rails. Since the Administrations appeared to be of differing opinions, however, it was agreed to retain the general sense in a somewhat modified form.

After a discussion between the PRESIDENT, Messrs. VIANI, *Reporter*, COOK, STEVENS (*East African Railway*) and NOUVION (*French National Railways*), the proposal by Mr. C. MARTIN was approved.

At the request of Mr. ALSTRÖM (*Swedish State Railways*), and after discussion between Messrs. RAVENET (*French National Railways*) and COLLINS (*Coras Iompair Eireann*), it was decided to replace the term « track oilers » by « lubricators » to correspond with the French text and to cover both flange and rail lubricators.

Mr. IVANČEVIĆ agreed with the figure shown for loss of metal in wheel returning, he stressed that this figure was no longer valid when weld metal was applied, and asked for a more precise wording.

Messrs. MAASS (*South African Railways*) and RAVENET did not agree with this proposed addition in view of the present state of development of this method. It was then decided to retain the text.

The final wording of this Summary No. 1 is as follows :

#### « Wear of rails and tyres.

« 1. The life of rails under electric traction, according to some Administrations, is less than with steam traction. This is not only due to electrification

itself, but in particular to the more intensive services which normally accompany electrification.

« Flange wear on tyres and side cutting of rails has been greatly reduced by the provision of lubricators placed at suitable positions at curves or on the locomotives. The reduction of flange wear is of great economic importance as approximately three times the flange wear has to be removed from the thread of the tyre to reform the flange. »

#### Summary No. 2

(paragraphs 3 to 6 of Chapter II) :

Permitted limits of wear of tyres vary considerably and there does not appear to have been any scientific or mathematical approach to establish the safe limits of the tyre profiles.

It has not been possible to establish any relationship between the type of suspension of the motors and tyre or rail wear. Although at first sight it would seem logical to suppose that completely suspended motors should have a beneficial effect, nearly all Administrations have used only axle hung or nose suspended motors. Much attention is however now being devoted to the application of fully suspended motors and it is anticipated that appreciable reduction of track wear will follow.

Practically all new electric locomotives are being constructed in the double bogie designs which limit wheel diameter to a maximum of about 4 feet (1.250 m). This does no doubt increase tyre wear and rail end hammering, although there are no quantitative effects to report and it is considered that the obtaining of 100 % of locomotive weight for adhesion justifies this.

Tyre wear does not vary in any relationship to its machined diameter within the overall variation permitted between maximum and minimum thickness.

This summary gave rise to a wide exchange of views.



Mr. IVANČEVIĆ criticized the first paragraph.

Messrs. NOUVION, Sir BRIAN ROBERTSON (*British Transport Commission*), COOK, C. MARTIN, VIANI, RAVENET, ALSTRÖM, KOSTER (*Netherlands Railways*) and IVANČEVIĆ discussed the advantage of fully suspended motors and their state of development.

Messrs. ALSTRÖM, C. MARTIN and RAVENET spoke on the question of adhesion.

— Following this discussion it was decided to present a new text for this summary.

*Summary No. 3*  
(paragraphs 7 to 10 of Chapter II):

No general agreement is indicated to limitations of axle-loading to wheel diameter. There are indications that thought is being given to this and some Administrations have in mind a figure of 4.5 to 5 t (axle load) per foot of diameter (14.5 to 16.5 t per metre). Such figures may however place onerous restrictions on locomotive design.

There is no direct evidence that speed of electric traction, by itself, contributes to rail or tyre wear.

A divergence of practice on the use of articulated or non-articulated bogies exists but up to the year of review articulated bogies appear to be more favoured and some Administrations report reduced flange wear with them, provided that there is a centralising force provided at the bogie ends.

Severe rail corrugation is only reported by one Administration.

After discussion between Messrs. IVANČEVIĆ, COOK, GERBER (*Swiss Federal Railways*) and NOUVION, the first paragraph was adopted without modification.

In the second paragraph, at the request

of Mr. ALSTRÖM, a reference was made to increased average speed.

The third paragraph was modified on the suggestion of Mr. RAVENET.

The final text is given below:

« 3. No general agreement is indicated to limitations of axle-loading to wheel diameter. There are indications that thought is being given to this and some Administrations have in mind a figure of 4.5 to 5 tons (axle load) per foot of diameter (14.5 to 16.5 t per metre). Such figures may however place onerous restrictions on locomotive design.

« There is no direct evidence that the increased average speed of electric traction, by itself, contributes to rail or tyre wear.

« There is no clear indication of the effect which the type of bogie (articulated or non-articulated) has on flange wear. Some Administrations report reduced flange wear with bogies having a centralising link between them. Any increase in recoil force beyond a certain limit, however, increases the amount of flange wear.

« Severe rail corrugation is only reported by one Administration. »

*Summary No. 4*  
(paragraphs 1 to 6 of Chapter III):

CHAPTER III.

**Maintenance of traction motors.**

Design of traction motors should enable long life to be obtained before commutators need to be dismantled for returning.

Mileages of 500 000 (800 000 km) should be obtained so that returning may not be necessary before the general repair stage of the locomotive is reached. There is a constant aim to make this mileage rise.

Attention is being given to the use of improved forms of insulation so that this will not cause a shortfall in life of traction motors.

There is division of opinion as to whether it is necessary to fit keys in armature shafts and pinions; the fitting of keys predominates.

It is universal practice to fit pinion on to shaft by shrinking on a taper.

Opinion is also divided concerning the desirability of keeping pinions and spur wheels mated.

The first two paragraphs were modified at the suggestion of Mr. C. MARTIN, who pointed out that a mileage of 800 000 km mentioned was greatly exceeded on the S.N.C.F. where 1 200 000 km were achieved by means of a bogie change at 600 000 km.

Mr. RAVENET proposed an improved text for the third paragraph, which was adopted.

Mr. NOUVION stressed the tendency to eliminate keys for fixing the pinion on the armature shaft of modern stock. He proposed an amendment which was adopted.

The text of this summary is given hereafter :

#### « Maintenance of traction motors.

« 4. Design of traction motors should enable as high a mileage as possible to be obtained before commutators are re-turned. Mileages of 500 000 (800 000 km) should be obtained so that re-turning may not be necessary before the general repair stage of the locomotive is reached. There is a constant aim to make this mileage rise.

« The use of modern insulating ma-

terials allows, on one hand, the design of new motors with a higher power in relation to volume and on the other hand, an increase in the life of existing types of motors.

« There is division of opinion as to whether it is necessary to fit keys in armature shafts and pinions; the fitting of keys predominates on older types of motors but there is a tendency to eliminate keys in new types.

« It is universal practice to fit pinion on to shaft by shrinking on a taper.

« Opinion is also divided concerning the desirability of keeping pinions and spur wheels mated. »

#### *Summary No. 5*

*(paragraph 7 of Chapter III) :*

Flashovers on electric locomotives appear to be rare and when they do occur, are generally caused by frost and snow, contamination by smoke, dust and exhaust from steam locomotives or by lightning.

There are, however, varying devices to assist in current collection :

- use of two pantographs or one pantograph with two shoes to reduce current collection per pan or pantograph;
- provision of two or more collecting strips on each shoe;
- improvement of the general design of the pantograph including provision of auxiliary springs to help shoe to follow the wire and of air vanes on high speed locomotives to keep shoe level;
- fitting of arrestors on locomotives to limit surges caused by lightning;
- instructions to train crews to limit current and fine division of resistances to assist in this;
- in a few cases, fitting of separate wheel slip indicators, but crews are also taught to reduce this from armature field meters;
- provision of arcing horns to prevent burning of commutator bars when flashover does occur;

— provision of high speed breakers with lower overload in place of fuses so that the current can be quickly restored after the flashover has occurred.

Mr. PICARD (*French National Railways*), supported by Mr. MAASS stated that the extent of this summary made the question of flash-overs appear of unwarranted importance.

Messrs. EBELING (*International Railway Union*) and ALSTRÖM asked for mention to be made of the effect of direct and alternating current respectively.

Messrs. NOUVION, C. MARTIN and IVANČEVIĆ also took part in the discussion.

The PRESIDENT then proposed that in view of the contradictory proposed additions and deletions a new text should be submitted at the next meeting. (*Approved.*)

#### *Paragraph 8 of Chapter III :*

No reports have been received of the use of roller bearings for axle suspension of nose suspended motors.

The Meeting agreed that this paragraph should be deleted.

#### *Summary No. 6 (Chapter IV) :*

##### CHAPTER IV.

##### Lubricants.

Grease lubrication is used generally in traction motor armature bearings.

Both grease and oil are used in axle or hollow shaft bearings.

Different characteristics are specified in lubricants to meet seasonal changes of temperature but generally this becomes a gradual change towards the desired properties by addition rather than complete changes.

Heavy grease or gear compound is used universally in traction motor gears.

No reports of the use of new lubricants (bisulphide of molybdenum or lithium) have been received.

This summary was adopted with the use, at the request of Mr. IVANČEVIĆ, of the words « roller bearings » in place of bearings.

The final text is given hereafter :

##### « Lubricants.

« 6. Grease lubrication is used generally in traction motor armature roller bearings.

« Both grease and oil are used in axle or hollow shaft bearings.

« Different characteristics are specified in lubricants to meet seasonal changes of temperature but generally this becomes a gradual change towards the desired properties by addition rather than complete changes.

« Heavy grease or gear compound is used universally in traction motor gear.

« No reports of the use of new lubricants (bisulphide of molybdenum or lithium) have been received. »

#### *Summary No. 7 (Chapter V) :*

##### CHAPTER V.

##### Wear on the pantograph strips.

Pantograph strips most generally used are flat strips of copper, aluminium copper, cadmium copper or copper bearing steel but there is a tendency to a more general use of carbon.

Graphite grease is the most usual lubricant. It can be applied quickly and easily and is effective.

When pantograph strips are worn, it is usual to change pans.



For a given material, strip life varies considerably, being influenced by climatic and atmospheric conditions and by speed and type of service.

Upward pressure of pantograph is generally specified to be between 16 and 20 lbs. (7 and 9 kg).

After discussion between the PRESIDENT, MESSRS. IVANČEVIĆ, COOK, EBELING, RAVENET, it was decided to modify the end of the first paragraph to show the present marked tendency to use carbon and metallised carbon, on the basis of experience and trial.

At the request of Mr. EBELING, pantograph pressure was included as a factor in wear.

It was also agreed that the pressures quoted were static pressures.

The final text is shown below :

**« Wear on the pantograph strips.**

« 7. Pantograph strips most generally used are flat strips of copper, aluminium copper, cadmium copper or copper bearing steel but there is a tendency to a more general use of carbon.

« Recent experience and trials have shown a tendency towards more general use of carbon and metallized carbon.

« Graphite grease is the most usual lubricant. It can be applied quickly and easily and is effective.

« When pantograph strips are worn, it is usual to change pans.

« For a given material, strip life varies considerably, being influenced by climatic and atmospheric conditions, speed, type of service and pantograph pressure.

« Upward static pressure of pantograph is generally specified to be between 16 and 20 lb. (7 and 9 kg). »

The PRESIDENT closed the meeting at 1 p.m.

— The next meeting will be held on Monday, 6th October at 9.30 a.m.

**Meeting held on the 6th October 1958.**

The PRESIDENT opened the meeting at 9.30 a.m. and asked Mr. COOK, *Special Reporter*, to read the revised texts of *Summaries Nos. 2 and 5*.

These texts were *adopted* without discussion and are shown hereafter :

*Summary No. 2:*

**« Wear of rails and tyres.**

« 2. The amounts of wear permitted for tyres vary somewhat between the Administrations and are based mainly on experience. Practical and theoretical studies to determine better limiting profiles are being pursued.

« Some Administrations have so far used only nose suspended motors; others have also used fully suspended motors.

« It has not been possible to establish any definite relationship between motor suspension systems and wear on tyre or rail. Whereas fully suspended motors have been adopted principally for the advantages gained in the working conditions of the motors themselves, it is also anticipated that the reduction in unsprung weight will result in an improvement in the life of tyres and rails.

« Practically all new electric locomotives are being constructed in the double bogie designs which limit wheel diameter to a maximum of about 4 feet (1.250 m). This does no doubt increase

tyre wear and rail end hammering, although there are no quantitative effects to report but it is considered that these drawbacks are largely compensated by the advantage of total adhesion of the locomotive.

« Tyre wear does not vary in any relationship to its machined diameter within the overall variation permitted between maximum and minimum thickness. »

#### *Summary No. 5 :*

##### « Maintenance of traction motors.

« 5. Flashovers on electric locomotives are rare. They are generally caused by frost and snow, contamination by smoke, dust and exhaust from steam locomotives or by lightning.

« The preventative measures which are detailed in the reports, concern briefly :

- « — current collection;
- « — design of motors;
- « — design of protective equipment;
- « — design of control gear and driving technique. »

The Section then continued the discussion of the other summaries.

#### CHAPTER VI.

##### Organisation of maintenance and periodicity.

Electric locomotives are expected to run large mileages of the order of 500 000 miles (800 000 km) over a period of 4 to 5 years before requiring complete overhaul.

Daily inspections are of a very minor nature when they are carried out and it is normal to carry out depot inspections at intervals of 7 to 21 days.

Three principal components which may govern periods between depot inspections are pantographs, brake blocks and tyres.

Change of bogie at Works forms the quickest method of releasing locomotives for further service when tyres are worn to the limit.

Some Administrations replace heavy flange wear of tyres by deposition of weld metal without any subsequent machining.

The quoted mileage of 500 000 (800 000 km) seemed, to some delegates, too low. After discussion between Messrs. KOSTER, COOK, ALSTRÖM, C. MARTIN, NOUVION, GERBER and PICARD, it was decided to qualify the first paragraph by adding a sentence « Certain Administrations report increased mileages with new locomotives ».

The periods mentioned for depot inspection were not agreed to by Mr. RAVENET; after contributions by the PRESIDENT, Messrs. COOK, SYKES (*British Railways*), C. MARTIN, JULIEN (*Ministère des Travaux Publics et des Transports, France*), MAASS, it was agreed to include the figures « 7 to 45 » and to mention that it varied according to the type of inspection and service operated.

Mr. WATKINS (*British Transport Commission*), asked if bogie changes were in fact the quickest and cheapest way of effecting a repair.

Mr. C. MARTIN mentioned the reprofiling of tyres without removal of axles from the locomotive, which was being widely used on the S.N.C.F.

After discussion between Messrs. MAASS, RAVENET, COOK and SYKES, a text proposed by Mr. C. MARTIN was finally adopted.

At the request of Mr. DA CUNHA MONTEIRO (*Portuguese Railways*), the last

paragraph was modified by the replacement of the word « some » by « a few ».

— The final text is shown below :

### **« Organisation of maintenance and periodicity.**

« 8. Electric locomotives are expected to run large mileages of the order of 500 000 miles (800 000 km) over a period of 4 to 5 years before requiring complete overhaul. Certain Administrations report increased mileages with new locomotives.

« Daily inspections are of a very minor nature when they are carried out; depot inspections vary widely between Administrations (from 7 to 45 days according to the type of inspection and service operated).

« Three principal components which may govern periods between depot inspections are pantographs, brake blocks and tyres.

« A change of bogie, either in works or depot, or the use of re-profiling equipment without removal of the wheels from under the locomotive allows the rapid return of the locomotive to service when the tyres require reprofiling.

« A few Administrations replace heavy flange wear of tyres by deposition of weld metal without subsequent machining. »

### *Summary No. 9 (Chapter VII) :*

#### **CHAPTER VII.**

#### **Organisation of the service.**

Common user of electric locomotives, without segregation to individual drivers or small groups of drivers, is practically universal, particularly on the longest services.

Unless there are particular local reasons,

there is no need for locomotives to return to depot until required for periodic maintenance. They can be immobilised in sidings and stations or actually on stabled trains ready to start work.

Electric locomotives are capable of practically continuous working and all Administrations aim at keeping them on continuous duty, changing crews whenever necessary. No adverse effect of this system can be detected.

Adequate cab heating is necessary when locomotives work or are temporarily stabled in low atmospheric temperatures.

A discussion took place between Messrs. C. MARTIN, COOK, NOUVION, ALSTRÖM, GERBER and DA CUNHA MONTEIRO. This summary was adopted with the following modifications :

Removal of the word « actually » in the second paragraph.

The elimination of the last sentence of the third paragraph.

The agreed text is shown hereafter :

### **« Organisation of the service.**

« 9. Common user of electric locomotives, without segregation to individual drivers or small groups of drivers, is practically universal, particularly on the longest services.

« Unless there are particular local reasons, there is no need for locomotives to return to depot until required for periodic maintenance. They can be immobilised in sidings and stations or on stabled trains ready to start work.

« Electric locomotives are capable of practically continuous working and all Administrations aim at keeping them on continuous duty, changing crews whenever necessary.



« Adequate cab heating is necessary when locomotives work or are temporarily stabled in low atmospheric temperatures. »

*Summary No. 10*  
(paragraphs 1 to 3 of Chapter VIII) :

#### CHAPTER VIII.

##### Cost of maintenance.

The ultimate basis upon which maintenance costs can be judged is cost per mile or kilometre.

The general aim is to obtain a very high mileage before workshop heavy repairs with extensive dismantling are necessary and at the same time to keep day to day maintenance costs low. The items which may contribute to this aim are :

- critical examination of costs of repairing components;
- critical examination of frequency of repairs to components;
- improvement of design to reduce wear and frequency of repairs;
- improvement of workshop methods to reduce costs of repairs;
- specialisation of the manufacture of spare parts and components;
- training of staff for specific maintenance operations.

Although the cost of each short or long period inspection is low, the sum total per annum of depot maintenance is high — generally greater than Main Works maintenance and this gives considerable scope for scrutiny with a view to effecting reduced costs.

Mr. PICARD proposed that amongst the points contributing to reduced maintenance costs, mention should be made of easy access to and removal of unit assemblies to allow their repair away from the locomotive. (*Approved.*)

Mr. C. MARTIN proposed a modification of the text to summarise the various points mentioned under three basic cate-

gories, choice of maintenance periods, improved maintenance methods, and design.

Mr. COOK stated that these ideas were all contained in the fourth paragraph worded as follows :

The overall requirement, for which the electric locomotive has the possibility with suitable design and manufacture, is extensive user with minimum of idle periods, together with long periods between withdrawals for maintenance purposes.

The PRESIDENT proposed that the text should not be altered but that this fourth paragraph should be included in Summary No. 10; which was agreed.

A discussion also arose on the comparative costs of workshop and depot maintenance in which Messrs. PICARD, COOK, ALSTRÖM and C. MARTIN, took part.

The text of the summary will be mentioned under No. 11, worded as hereafter :

« 11. The ultimate basis upon which maintenance costs can be judged is cost per mile or kilometre.

« The general aim is to obtain a very high mileage before workshop heavy repairs with extensive dismantling are necessary and at the same time to keep day to day maintenance costs low. The items which may contribute to this aim are :

« — critical examination of costs of repairing components;

« — critical examination of frequency of repairs to components;

« — improvement of design to reduce wear and frequency of repairs;

« — improved design to facilitate accessibility and the removal of com-

ponents in unit assemblies for repair off the locomotive;

« — improvement of workshop methods to reduce cost of repairs;

« — specialisation of the manufacture of spare parts and components;

« — training of staff for specific maintenance operations.

« Although the cost of each short or long period inspection is low, the sum total of depot maintenance is high — in some cases greater than Main Works maintenance and this gives considerable scope for scrutiny with a view to effecting reduced costs.

« The overall requirement, for which the electric locomotive has the possibility with suitable design and manufacture, is extensive user with minimum of idle periods, together with long periods between withdrawals for maintenance purposes. »

#### *Summary No. 11*

*(final paragraph of Chapter VIII) :*

Only one Administration quotes a relation between maintenance costs and age of the locomotive. Another point of view is that it is more closely related to the age of design.

Messrs. MAASS and MARTIN considered that it would be preferable to put this summary at the beginning of Chapter VIII, *Cost of maintenance*; it would then become No. 10. *(Approved.)*

Following a remark by Mr. NOUVION, the final modified text is shown below :

#### « Cost of maintenance.

« 10. Only one Administration quotes a relation between maintenance and age

of the locomotives. A more general point of view is that it is more closely related to the age of design. »

The PRESIDENT on his own behalf and in the name of the delegates, thanked the *Special Reporters*, Messrs. COOK and GAEBLER, as well as Messrs. VIANI and CANAVEZES, *Reporters*, for Questions 4 and 3 respectively, for the work which they had undertaken. *(Applause.)*

He also expressed his thanks to the members of the Bureau and of the secretariat. Finally, he thanked the delegates for their effective participation in the discussions.

Mr. C. MARTIN expressed, on behalf of the delegates, his gratitude to the PRESIDENT for the able manner in which he had conducted the meetings of the Section. *(Applause.)*

The PRESIDENT then declared the meeting of Section II closed.

The meeting ended at 11.40 a.m.

— The complete text of the Summaries adopted is reproduced hereafter :

### SUMMARIES.

#### **Wear of rails and tyres.**

« 1. The life of rails under electric traction, according to some Administrations, is less than with steam traction. This is not only due to electrification itself, but in particular to the more intensive services which normally accompany electrification.

« Flange wear on tyres and side cut-

« ting of rails has been greatly reduced  
« by the provision of lubricators placed  
« at suitable positions at curves or on  
« the locomotives. The reduction of  
« flange wear is of great economic im-  
« portance as approximately three times  
« the flange wear has to be removed  
« from the thread of the tyre to reform  
« the flange.

« 2. The amounts of wear permitted  
« for tyres vary somewhat between the  
« Administrations and are based mainly  
« on experience. Practical and theo-  
« retical studies to determine better limit-  
« ing profiles are being pursued.

« Some Administrations have so far  
« used only nose suspended motors;  
« others have also used fully suspended  
« motors. It has not been possible to  
« establish any definite relationship  
« between motor suspension systems and  
« wear on tyre or rail. Whereas fully  
« suspended motors have been adopted  
« principally for the advantages gained  
« in the working conditions of the mo-  
« tors themselves, it is also anticipated  
« that the reduction in unsprung weight  
« will result in an improvement in the  
« life of tyres and rails.

« Practically all new electric loco-  
« motives are being constructed in the  
« double bogie designs which limit wheel  
« diameter to a maximum of about 4 feet  
« (1.250 m). This does no doubt in-  
« crease tyre wear and rail end ham-  
« mering, although there are no quanti-  
« tative effects to report but it is con-  
« sidered that these drawbacks are  
« largely compensated by the advantage  
« of total adhesion of the locomotive.

« Tyre wear does not vary in any

« relationship to its machined diameter  
« within the overall variation permitted  
« between maximum and minimum  
« thickness.

« 3. No general agreement is indi-  
« cated to limitations of axle-loading to  
« wheel diameter. There are indications  
« that thought is being given to this and  
« some Administrations have in mind a  
« figure of 4.5 to 5 tons (axle load) per  
« foot of diameter (14.5 to 16.5 tons  
« per metre). Such figures may how-  
« ever place onerous restrictions on loco-  
« motive design.

« There is no direct evidence that the  
« increased average speed of electric  
« traction, by itself, contributes to rail  
« or tyre wear.

« There is no clear indication of the  
« effect which the type of bogie (arti-  
« culated or non-articulated) has on  
« flange wear. Some Administrations  
« report reduced flange wear with bogies  
« having a centralising link between  
« them. Any increase in recoil force  
« beyond a certain limit, however, in-  
« creases the amount of flange wear.

« Severe rail corrugation is only re-  
« ported by one Administration.

### Maintenance of traction motors.

« 4. Design of traction motors should  
« enable as high a mileage as possible  
« to be obtained before commutators  
« are re-turned. Mileages of 500 000  
« (800 000 km) should be obtained so  
« that re-turning may not be necessary  
« before the general repair stage of the  
« locomotive is reached. There is a  
« constant aim to make this mileage rise.



« The use of modern insulating materials allows, on one hand, the design of new motors with a higher power in relation to volume and on the other hand, an increase in the life of existing types of motors.

« There is division of opinion as to whether it is necessary to fit keys in armature shafts and pinions; the fitting of keys predominates on older types of motors but there is a tendency to eliminate keys in new types.

« It is universal practice to fit pinion on to shaft by shrinking on a taper.

« Opinion is also divided concerning the desirability of keeping pinions and spur wheels mated.

« 5. Flashovers on electric locomotives are rare. They are generally caused by frost and snow, contamination by smoke, dust and exhaust from steam locomotives or by lightning.

« The preventative measures which are detailed in the reports, concern briefly :

- « current collection,
- « design of motors,
- « design of protective equipment,
- « design of control gear and driving technique.

### **Lubricants.**

« 6. Grease lubrication is used generally in traction motor armature roller bearings.

« Both grease and oil are used in axle or hollow shaft bearings.

« Different characteristics are specified in lubricants to meet seasonal

« changes of temperature but generally this becomes a gradual change towards the desired properties by addition rather than complete changes.

« Heavy grease or gear compound is used universally in traction motor gear.

« No reports of the use of new lubricants (bisulphide of molybdenum or lithium) have been received.

### **Wear on the pantograph strips.**

« 7. Pantograph strips most generally used are flat strips of copper, aluminium copper, cadmium copper or copper bearing steel but there is a tendency to a more general use of carbon.

« Recent experience and trials have shown a tendency towards more general use of carbon and metallized carbon.

« Graphite grease is the most usual lubricant. It can be applied quickly and easily and is effective.

« When pantograph strips are worn, it is usual to change pans.

« For a given material, strip life varies considerably, being influenced by climatic and atmospheric conditions, speed, type of service and pantograph pressure.

« Upward static pressure of pantograph is generally specified to be between 16 and 20 lb. (7 and 9 kg).

### **Organisation of maintenance and periodicity.**

« 8. Electric locomotives are expected to run large mileages of the order of 500 000 miles (800 000 km) over a

« period of 4 to 5 years before requiring  
« complete overhaul. Certain Admin-  
« strations report increased mileages  
« with new locomotives.

« Daily inspections are of a very  
« minor nature when they are carried  
« out; depot inspections vary widely be-  
« tween Administrations (from 7 to  
« 45 days according to the type of  
« inspection and service operated).

« Three principal components which  
« may govern periods between depot  
« inspections are pantographs, brake  
« blocks and tyres.

« A change of bogie, either in works  
« or depot, or the use of re-profiling  
« equipment without removal of the  
« wheels from under the locomotive al-  
« lows the rapid return of the locomotive  
« to service when the tyres require  
« reprofiling.

« A few Administrations replace  
« heavy flange wear of tyres by deposi-  
« tion of weld metal without subsequent  
« machining.

#### **Organisation of the service.**

« 9. Common user of electric loco-  
« motives, without segregation to indi-  
« vidual drivers or small groups of  
« drivers, is practically universal, parti-  
« cularly on the longest services.

« Unless there are particular local  
« reasons, there is no need for loco-  
« motives to return to depot until re-  
« quired for periodic maintenance. They  
« can be immobilised in sidings and sta-  
« tions or on stabled trains ready to  
« start work.

« Electric locomotives are capable of  
« practically continuous working and

« all Administrations aim at keeping  
« them on continuous duty, changing  
« crews whenever necessary.

« Adequate cab heating is necessary  
« when locomotives work or are tem-  
« porarily stabled in low atmospheric  
« temperatures.

#### **Cost of maintenance.**

« 10. Only one Administration quotes  
« a relation between maintenance and  
« age of the locomotives. A more  
« general point of view is that it is more  
« closely related to the age of design.

« 11. The ultimate basis upon which  
« maintenance costs can be judged is  
« cost per mile or kilometre.

« The general aim is to obtain a very  
« high mileage before workshop heavy  
« repairs with extensive dismantling are  
« necessary and at the same time to keep  
« day to day maintenance costs low.  
« The items which may contribute to  
« this aim are :

« — critical examination of costs of  
« repairing components;

« — critical examination of frequency  
« of repairs to components;

« — improvement of design to reduce  
« wear and frequency of repairs;

« — improved design to facilitate  
« accessibility and the removal of com-  
« ponents in unit assemblies for repair  
« off the locomotive;

« — improvement of workshop me-  
« thods to reduce cost of repairs;

« — specialisation of the manufac-  
« ture of spare parts and components;

« — training of staff for specific  
« maintenance operations.

« Although the cost of each short or  
« long period inspection is low, the sum  
« total of depot maintenance is high —  
« in some cases greater than Main  
« Works maintenance and this gives  
« considerable scope for scrutiny with  
« a view to effecting reduced costs.

« The overall requirement, for which  
« the electric locomotive has the possi-

« bility with suitable design and manu-  
« facture, is extensive user with mini-  
« mum of idle periods, together with  
« long periods between withdrawals for  
« maintenance purposes. »

— These Summaries were ratified by  
the Plenary Meeting of the 7th October  
1958.

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## SECTION III. — Working.

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*President* : Mr. R. SOULARD.

*Vice-Presidents* : Messrs. D.J. WANSINK, W. WYRZYKOSKI, J.P. MUSQUAR  
and M. DIAS TRIGO.

*Principal Secretary* : Mr. A. MARCHAL.

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### QUESTION 5.

- a) **Handling facilities in the goods depots for consignments in less than carloads, containers. General arrangement of the depots. Liaisons between the staff of the depot and the delivery services.**
- b) **Railway problems regarding the introduction of general palletisation of packages.**

#### Preliminary documents.

Report (America [North and South], Australia [Commonwealth of], Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, Netherlands, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by M. J. DORJEE. (See *Bulletin* for March 1958, p. 231.)

Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, West Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Viet-Nam and Yugoslavia), by M. MARCHAND. (See *Bulletin* for April 1958, p. 447.)

Special Report, by M. MARCHAND. (See *Bulletin* for September 1958, p. 1386.)

### Report of Section III.

(See the *Congress Daily Journal* : No. 2, p. VI; No. 3, p. VI and XIII; No. 5, p. I and No. 7, p. IX.)

#### Meeting of the 30th September 1958.

The meeting was opened at 9.30 a.m. by Mr. R. SOULARD, *President*, who called upon Mr. MARCHAND, *Special Reporter*.

Mr. MARCHAND, before opening the discussion on the summaries, said that the REPORTERS had deemed it necessary to precede point (a) of Question 5 with general considerations on the organisation of the conveyance of parcels traffic, as the solutions to be applied to the mechanisation of this conveyance is obviously dependent upon the overall organisation adopted to carry it out.

The REPORTERS, therefore, had broadened the scope within which the question had been put to them.

The discussion then opened on the summaries of the *Special Report*.

Mr. MARCHAND read the summaries in succession.

## I. General observations.

### *Summary No. 1 :*

1. The relative importance of the parcels traffic differs appreciably from one country to another. It is linked up with the economic and social structure of each country and also, naturally, with the general organisation of its transport.

Each Administration must not overlook such parallelism, as the evolution of these structures affects the parcels traffic and requires decisions to be reached concerning the organisation and measures of adaptation to be taken.

— This summary was adopted without comment.

### *Summary No. 2 :*

2. The permanent objective to be aimed at is to improve the parcels traffic both as regards quality (rapidity of transport, no damage, door to door transport, etc.) and costs.

In this connection it is essential :

- to reduce handling operations;
- to mechanise such handling;
- to make good use of the wagons.

After Mr. CREM (*Belgian National Railways*) had stressed the importance of regularity in the conveyance of parcels traffic, Summary No. 2 was adopted in the following form :

« 2. The permanent objective to be aimed at is to improve the parcels traffic both as regards quality (rapidity and regularity of transport, no damage, door-to-door transport) and costs.

« In this connection it is essential :

- « to reduce handling operations;
- « to mechanise such handling;
- « to make good use of the wagons. »

### *Summaries No. 3 and 4 :*

3. The « classic » type of organisation into regions and regional centres, based on the advantages gained by the concentration of the parcels at a reduced number of transit points and the making up of long distance through-wagons is adopted by all the Administrations of some importance.

It limits the number of stages and makes it possible, if the regional centres coincide with localities having an important traffic of their own, to transport a large number of parcels directly from the consigning station to the destination station.

4. However, in spite of the adoption of the « classic » organisation, it is impossible for very extensive railway systems — unless they consent to an inexcusable waste of rolling stock — to run through-wagons between all their regional centres. Intermediate transshipments are unavoidable for a certain number of long-distance consignments. It is advantageous to concentrate them into a small number of selected and suitably equipped points.

It is of advantage if such points coincide with the regional centres.

After reading the drafts of Summaries No. 3 and 4, there was a discussion, in which Messrs. CREM, TRIBELHORN (*Swiss Federal Railways*), DISCRY (*Belgian National Railways*) and DE BRUIN (*Netherlands Railways*) took part.

Mr. DISCRY said that he would particularly like to see shewn under this « General observations » heading, the possibility there is, when the traffic does not permit connection between two regional centres by through wagons running every day, of running these wagons two or three times a week.

Mr. DE BRUIN pointed out that certain regional centres are connected, not by

wagons, but by road vehicles carrying parcels traffic. It was therefore decided to adopt the following texts :

*Summary No. 3 :*

« 3. The « classic » type of organisation into regions and regional centres, based on the advantages gained by the concentration of the parcels (by road and by rail) at a reduced number of transit points and the making up of long distance through-wagons is adopted by all the Administrations of some importance.

« It limits the number of stages and makes it possible, if the regional centres coincide with localities having an important traffic of their own, to transport a large number of parcels directly without transhipment. »

*Summary No. 4 (partial text) :*

« 4. However, in spite of the adoption of the « classic » organisation, very extensive railway systems, in particular, cannot — unless they consent to an inexcusable waste of rolling stock — run through-wagons between all their regional centres. Intermediate transhipments are unavoidable for a certain number of long-distance consignments. It is advantageous to concentrate them into a small number of selected and suitably equipped points.

« It is of advantage if such points coincide with the regional centres. »

Furthermore, an additional paragraph will be added to the above-mentioned partial text of Summary No. 4, which will take into account the points raised by Messrs. DISCRY and DE BRUIN.

*Summaries No. 5 and 6 :*

5. Within the framework of the classic organisation, a free hand can to some extent be given to the stations to run other wagons than regular ones. The conditions under which such wagons are put in operation must be linked up with the length of the runs they have to make; the longer the run the more necessary it is to get sufficient use of such wagons.

This method, which can be used by all the consigning stations, makes it possible to avoid transhipments (transhipment at the centre station of the departure region or even at the centre station of the arrival region).

Certain Administrations use this method in the transhipment stations as well, but the rational use of such wagons then presupposes a preliminary knowledge of the actual traffic :

- either by a preliminary storing of the parcels on the platforms, which involves additional handling;
- or by preparing the work of the depots concerned from the waybills when these are sent with the wagons or by a parcels traffic planning.

6. Certain Administrations use the transport documents to regulate the forwarding of the parcels. Carried out in somewhat various ways, such an organisation makes it easier to :

- determine the cause and responsibility in case of delay, loss or damage;
- organise and control the handling operations.

In other countries, the transport documents are forwarded separately and are only checked against the parcels on arrival. Such an arrangement simplifies and appreciably speeds up the loading and unloading of the wagons at departure or en route.

— Adopted without alteration.

*Summary No. 7 :*

7. In many countries, the checking at departure and arrival have been considerably simplified in order to reduce costs.



At the suggestion of Mr. CREM, the following text was adopted :

« 7. In many countries, the checking at departure and arrival has been considerably simplified in order to speed up the work and reduce costs. »

The Section then considered « Chapter II » : *Goods depots*.

*Summary No. 8 :*

8. In depots where no transshipments take place, it is advisable to have the areas for the handling of incoming and outgoing goods under one roof.

This arrangement makes it possible to reduce the staff required for handling, and facilitates the supply of empty stock (wagons and pallets) to the « outgoing » area.

It may make it possible to deal with seasonal variations in the traffic by extending one area at the expense of the other, or even, exceptionally, provided door to door deliveries are carried out immediately by the delivery service, to use the same area for both purposes : handling at arrival in the morning and forwarding in the evening.

In the interest of the customers, it is desirable to avoid forwarding in separate buildings allocated to different destinations.

After reading the draft text, there was an exchange of views, in the course of which Messrs. TRIBELHORN, CIRILLO (*Italian State Railways*), FIENNES, BLEE (*British Railways*), DISCRY and DORJEE (*Reporter*), took part.

The following text was approved in accordance with the wishes of the REPORTERS who were anxious to give this summary the form of a recommendation :

« 8. In depots where no transshipments take place, it is recommended that there should be areas for the handling of incoming and outgoing goods under one roof.

« This arrangement makes it possible to reduce the staff required for handling, and facilitates the supply of empty stock (wagons and pallets) to the « outgoing » area.

« It may make it possible to deal with seasonal variations in the traffic by extending one area at the expense of the other, or even exceptionally, provided door to door deliveries are carried out immediately by the delivery service, to use the same area for both purposes : handling at arrival in the morning and forwarding in the evening.

« In the interest of the customers, it is desirable to avoid forwarding in separate buildings allocated to different destinations. »

*Summary No. 9 :*

9. In stations with a transshipment area, especially in the regional centres, it is advantageous, in order to obtain a greater concentration of parcels, to juxtapose :

- the « transshipment » and « arrival » or « transshipment » and « departure » areas, according to the amount of traffic that can be combined in this way;
- or even, better still, to combine all the areas into a « single depot ».

— Adopted without alteration.

*Summary No. 10 :*

10. Railway depots must be as far as possible :

- close to the industrial and commercial areas of the towns they serve;
- have convenient road access and a long road frontage which can be extended should the road services eventually be further developed;
- and have suitable connection by rail with the reception and formation sidings for the parcels trains; for this purpose the marshalling yard should be as close as possible to the depots.

Following the reading of the draft text Mr. BLEE said that one must not lose sight of the cost involved in « tripping » from depot to yard.

After some discussion the following text was adopted :

« 10. Railway depots must be, as far as possible :

« — close to the industrial and commercial areas of the towns they serve;

« — have convenient road access and a long road frontage which can be extended should the road services eventually be further developed;

« — and have easy connection by rail with the reception and formation sidings for the parcels trains; for this purpose the marshalling yard should be as close as possible to the depots. »

#### *Summary No. 11 :*

11. Most of the depots with small of average traffic are so designed that they have an extensive length and can be served by a single siding, or two at the most.

Large depots, especially those which include a transshipment area must, on the other hand, be planned on compact lines so as to reduce the distance goods have to be conveyed over; they are therefore always served by several sidings.

Arrangements which include dead-end sidings and a platform at right angles to them avoid the operations of conveying the goods and bringing in or taking away wagons interfering with each other.

— Adopted without alterations.

#### *Summary No. 12 :*

12. When it is necessary to cross over the sidings to get from one platform to another (as in the case of very long platforms or depots served from both ends), the goods can be handled by going through the wagons, or else, use can be made of flat

wagons arranged for this purpose, or finally in the case of large installations, fixed bridges with a movable deck can be used; but with all these methods the handling of the goods is interrupted whilst the wagons are being put into position or taken away.

Mr. CREM proposed alterations as a result of which the suggested text was reduced and adopted as follows :

« 12. When it is necessary to cross over the sidings to get from one platform to another (as in the case of very long platforms or depots served from both ends), the goods can be handled by going through the wagons or else, use can be made of flat wagons arranged for this purpose, or finally in the case of large installations, fixed bridges with a moveable deck can be used. »

#### *Summary No. 13 :*

13. The design, space required and division of the handling areas depend mainly upon the following factors :

- the amount of goods to be handled and the relative volume of the peak traffic;
- the ratio in amounts of incoming, outgoing and transshipment goods;
- the number of destinations over which the traffic is spread and the number of delivery zones;
- the existence of collection and delivery services belonging to or attached to the railway;
- the system of dispatch;
- the method of working adopted with or without mechanisation of handling operations.

— Adopted without modification.

#### *Summary No. 14 :*

14. The most generally prevailing tendency as regards the layout of the different areas in the large depots can be summed up as follows :

- small « consigning » areas limited to

the space necessary for accepting, and if necessary, sorting parcels before conveying them to the wagons;

- extensive « arrival » areas because of the space needed for the storage of the parcels pending delivery.

It should be noted that:

- when goods are collected at the station much more room is needed than when they are home-delivered;
- the space required for the storage of parcels at the end of the week which parcels cannot be delivered because the shops are closed is generally becoming greater and greater owing to the social evolution taking place.

As regards the platforms serving the sidings, their width varies dependent on the mechanisation of the handling and the amount of goods to be put onto the platforms before being loaded into the wagons.

Mr. DISCRY mentioned the case of Belgium where the highly-developed system of road collection services has brought about heavy peaks in the work in certain « consigning » areas and consequently makes it necessary for these areas to be fairly extensive.

Mr. BLEE pointed out that in Great Britain the organisation of certain « arrivals » areas, characterised by the speed of the transfer of the parcels from the wagons to the delivery vans, allows a reduction in the surface of these areas.

Mr. THORHAG (*Danish State Railways*) mentioned, contrary to Great Britain, the case of Sweden where delivery to domicile being but little developed, the arrival areas must be rather large.

— In order to bring together these points of view and those of the REPORTERS, it was decided that they should put forward at the next meeting a new text for Summary No. 14.

### *Summary No. 15 :*

15. The development of mechanised handling makes it necessary to see that there are no obstacles on the platforms and that these have good running surfaces.

In nearly every country the height of the platforms corresponds with that of the floors of railway vehicles (1.15 m to 1.2 m = 3' 9 3/8" to 3' 11 1/4"), so that goods are handled on the same level.

There are difficulties on the road side in every case, since the floors of private lorries and delivery vehicles are at very varying levels.

In order to handle heavy parcels, pallets and small containers, in spite of such differences in level, certain Administrations use fixed bridges or movable ones operated by jacks.

In this connection, some standardisation of the different categories of road vehicles would be advisable.

— Adopted without modification.

The Section then considered « Chapter III » : *Traditional handling*.

### *Summary No. 16 :*

16. The wheelbarrows, stillages and hand trucks commonly used in the small stations are also adequate equipment in the large depots for all handling of goods of low weight or small size within a limited radius of action.

— Adopted without alteration.

### *Summary No. 17 :*

17. In the large depots, when the goods have to be conveyed over longer distances, it is essential in order to reduce costs, to group the parcels into larger units for internal transport and to mechanise their conveyance.

This is effected by loading them onto power trucks, or on trailers or semi-trailers which are then coupled to tractors. Some countries also make use of overhead or underground traction-chains to which trucks are coupled. Belt conveyors are no longer used to move the parcels in this way.



The part of the text proposed by the *Special Reporter* relating to the non-utilisation of belt conveyors for the movement of parcels over long distances gave rise to certain comments.

Dr. WENDLER (*Deutsche Bundesbahn*) confirmed that the German Railways after having used this method have now abandoned it.

But Mr. THORHAG pointed out that the Swedish State Railways are now installing, in two stations, belt conveyors for this movement.

Following comments by Mr. BLEE, Mr. MARCHAND stated that in the United States the use of belt conveyors for this purpose had, he believed, also been abandoned.

Summary No. 17 was then adopted in the following form :

« 17. In the large depots, when the goods have to be conveyed over longer distances, it is essential, in order to reduce costs, to group the parcels into larger units for internal transport and to mechanise their conveyance.

« This is effected by loading them onto power trucks, or on trailers or semi-trailers which are then coupled to tractors. Some countries also make use of overhead or underground traction-chains to which trucks are coupled.

« Belt conveyors are rarely used to move the parcels in this way. »

#### *Summaries No. 18, 19 and 20 :*

18. Assembling quantities of parcels for grouped handling generally implies their preliminary sorting per destination.

In the large depots, where the parcels are grouped for many different directions, it is generally necessary to set up several special sorting areas, which involves additional handling.

These operations can also be carried out by making a preliminary simplified sorting of the parcels and by using « distributing trucks », which are in fact mobile platforms running alongside the wagons to be loaded in the yards (depots without platforms).

19. The sorting of parcels can be facilitated :

- in the area in which the wagons are unloaded, by using slat-conveyors or unloading machines;
- in the area where small parcels are sorted, by using conveyor belts.

20. With a few rare exceptions, the special handling equipment is used in particular where heavy parcels are concerned.

In the large depots the movable hoists formerly used for this purpose are being replaced to an increasing extent either by fork lift trucks, or, in the case of very heavy parcels which are not loaded outside the shed by 1 t to 3 t mobile cranes working inside the shed, or large-capacity fork lift trucks.

— Adopted without discussion.

The Meeting passed to the discussion of « Chapter IV » : *Handling by means of pallets.*

21. When used for moving parcels in the depots the pallet has the following advantages :

- the handling of heavy parcels which is difficult with trucks on account of their inevitable loading height is facilitated;
- the four-entry pallet can be tackled from whatever side;
- the pallet provides a means of storage for the parcels, either by stacking the pallets or by placing them on racks;
- the space taken up by empty pallets is very small.

The use of pallets is therefore extremely advantageous in depots where space is scarce.

Messrs. CREM and DISCRY suggested a simplification of the proposed text and the following wording was then adopted :

« 21. When used for moving parcels in the depots the pallet has the following advantages :

« — the handling of heavy parcels which is difficult with truck on account of their inevitable loading height is facilitated;

« — the pallet provides a means of storage for the parcels either by stacking the pallets or by placing them on racks; the use of pallets is therefore extremely advantageous in depots where space is scarce. »

#### *Summary No. 22 :*

22. To be economic, handling and conveyance should be carried out :

- over short distances, by hand pallet trucks on simple rollers or, better still, of the bogie type or by pedestrian-controlled power fork lift trucks;
- in the case of moderate distances (50 to 150 m = 55 to 165 yards) by rider-controlled fork lift trucks;
- for longer distances, by trains consisting of lift trucks and trolleys. The fork lift trucks can then be used as tractors if they are powerful and fast enough.

Messrs. JOHANNESSON and SCHERMAN (*Swedish State Railways*), said that they would like to see mention made of traction chains.

The following text was then adopted :

« 22. To be economic, handling and conveyance should be carried out :

« — over short distances, by hand pallet trucks on simple rollers or, better still, of the bogie type, or by pedestrian-controlled power fork lift trucks;

« — in the case of moderate distances (50 to 150 m = 55 to 165 yds.) by rider-controlled fork-lift trucks;

« — for longer distances, by trains consisting of lift trucks and trolleys. The fork lift trucks can then be used as tractors if they are powerful and fast enough. Traction chains can also be used for this, hauling either trolleys loaded with pallets or hand operated fork lift trucks which are loaded. »

#### *Summary No. 23 :*

23. The fork lift trucks have internal combustion engines or electric motors.

The purchase price of the former is lower, but the operational costs are higher. In general, they are faster so that they are likely to be preferred in depots of extensive length; the Administrations using them do not report any serious trouble arising from exhaust gases.

The characteristics of the fork lift trucks depend on the dimensions of the pallets used and those of the vehicles to be served (width of the wagons, width and height of the doorways, etc.).

The load which they can handle is limited by the strength of the wagon floors; it seems to be correct that a load of 1 t is sufficient for most Railway Administrations.

Mention should be made of the use of devices with mobile forks or mobile lift-frames (adjustable or retractable) intended to facilitate the manœuvres of the empty or loaded equipment.

— Adopted without discussion.

#### *Summary No. 24 :*

24. Many Administrations would like to be able to buy for their small depots simple low priced hand pallet trucks and stackers, in principle purely mechanically operated.

Improvements to fork lift trucks from the point of view of their dead weight and manœuvrability (radius of gyration, size) are also desired.

From an exchange of views in which MESSRS. CREM, BLEE, THORHAG and the REPORTERS participated, emerged the hope that small stations might be provided with more economic units without hydraulic pumps. The following text was then adopted :

« 24. Many Administrations would like to be able to buy for their small depots simpler and cheaper hand pallet trucks and stackers, in principle, purely mechanically operated.

« Improvements to fork lift trucks from the point of view of their dead weight and manoeuvrability (radius of gyration, size) are also desired. »

#### *Summary No. 25 :*

25. If the characteristics of the existing wagons are in general sufficient for the evolutions of fork lift trucks, a few improvements might nevertheless be considered in the design of future wagons, such as :

- increasing the strength of the floor;
- increasing the width and, if possible, the height of the doorways.

In this connection interesting trials have been reported as regards wagons with sliding sides.

Mr. WENDLER pointed out that the German Railways are not thinking of using wagons with sliding sides for the conveyance of parcels traffic.

The CHAIRMAN nevertheless considered that it would be as well to retain mention of this possibility, as certain countries are now thinking of trying it out.

Mr. DISCRY then remarked that it would be as well to make a reference in this point to the decision recently taken by

the Member Administrations of the I.R.U. (U.I.C.) in regard to the characteristics to be adopted for future stock.

The following text was then adopted :

« 25. If the characteristics of the existing wagons are, in general, sufficient for the evolutions of fork lift trucks, a few improvements, as recently decided upon by the Member Administrations of the I.R.U. (U.I.C.), might nevertheless be considered in the design of future wagons such as :

« — increasing the strength of the floor;

« — increasing the width and, if possible, the height of the doorways.

« In this connection, interesting trials have been reported as regards wagons sliding sides. »

— The meeting ended at 12.30 p.m.

#### **Meeting of the 1st October 1958.**

Mr. SOULARD, *President*, opened the meeting at 9.30 a.m. During the morning the following final texts were adopted :

#### *Summary No. 3 :*

« 3. The « classic » type of organisation into regions and regional centres, based on the advantages gained by the concentration of the parcels (by road and by rail) at a reduced number of transit points and the making up of long — distance through — wagons is adopted by all the Administrations of some importance.

« It limits the number of stages and makes it possible, if the regional centres coincide with localities having an impor-



tant traffic of their own, to transport a large number of parcels directly without transshipment. »

*Summary No. 4 :*

« 4. In order to have regular through services, it is advantageous to run them two or three times a week or to operate them with road vehicles.

« However, in particular, it is impossible for very extensive railway systems — unless they consent to an inexcusable waste of rolling stock — to operate regular through services between all their regional centres. Intermediate transshipments are unavoidable for a certain number of long-distance consignments. It is advantageous to concentrate them into a small number of selected and suitably equipped points.

« It is of advantage if such points coincide with the regional centres. »

*Summary No. 14 :*

« 14. The most generally prevailing tendency as regards the layout of the different areas in the large depots can be summed up as follows :

« — « consigning » areas limited to the space necessary for accepting, and if necessary, sorting parcels before conveying them to the wagons;

« — extensive « arrivals » areas because of the space needed for the storage of the parcels pending delivery.

« It should be noted that :

« — when goods are collected at the station much more room is needed than when they are home-delivered;

« — the space required for the storage of parcels at the end of the week, which

parcels cannot be delivered because the shops are closed is generally becoming greater and greater owing to the social evolution taking place.

« As regards the platforms serving the sidings, their width varies dependent on the mechanisation of the handling and the amount of goods to be put onto the platforms before being loaded into the wagons. »

The Section then considered « Chapter V » : *Collection and delivery services.*

*Summary No. 26 :*

26. Many Administrations are interested in collecting and still more in delivering parcels.

Sometimes the latter operation is included in the official rates for transport by rail and delivery is often assured either directly or through the intermediary of affiliated companies; if not, the Administrations conclude contracts with private firms in which they reserve the right of control of their services (service-times, charges).

— This text was adopted as indicated hereafter :

« 26. Many Administrations are interested in collecting and still more in delivering parcels.

« Sometimes these operations are included in the official rates for transport by rail and delivery is often assured either directly or through the intermediary of affiliated companies; if not, the Administrations conclude contracts with private firms in which they reserve the right of control of their services (service-times, charges). »

*Summary No. 27 :*

27. It is necessary to synchronise the collection and delivery operations and railway timetables. This is particularly important

as regards collecting parcels and the departure of the parcels trains.

As far as arrivals are concerned, the consequences of possible delays on the railway are mitigated by the fact that there are often two delivery rounds a day in the large centres.

During the discussion on summary No. 27, started by Mr. CREM, relating to the mechanisation of the ancillary services concerned with the forwarding of parcels — sorting, labelling, charging, making out the documents — some very interesting information was given by Mr. CREM as well as by Messrs. DORJEE and BLEE on the studies and trials undertaken in Belgium, Great Britain and the Netherlands, where for the mechanisation and simplification of these operations the most modern methods are used (punch cards, microfilms).

Mr. GARFIELD (*East African Railways and Harbours*) commented on the English text of Summary No. 27.

— Summary No. 27 was adopted worded as originally.

#### *Summary No. 28 :*

28. The conditions under which goods are transferred to the haulage services are linked up with the delivery methods used.

Most often the parcels are loaded onto the delivery vehicles in the opposite order to that of the delivery round.

In general, the delivery man being the only one who knows the round executes the loading :

- either — usually — by collecting parcels already sorted by the railway staff and put into the bays allocated to the different areas of the town;
- or by calling out the parcels which they have on their documents which are then conveyed by the depot staff from the place where they have been stored to the delivery vehicle.

Exceptionally, the parcels are loaded into the haulier's vehicle in a casual order (which implies the use of sparsely loaded trucks); in this case the depot staff can load the parcels as soon as they come in directly on these trucks, thus reducing the area of covered platform required for arrivals.

On the departure side, the hauliers are rarely required to classify the parcels. This is only done in stations with multiple forwarding areas for different destinations, or when there is only a very limited time to dispatch the parcels in a given direction.

One special case is that of the depots without platforms of certain Administrations; when the road vehicles can come in already sorted, the loads can be taken directly to the wagons.

Summary No. 28 gave rise to an exchange of views in which Messrs. DISCRY, TRIBELHORN, ARKLE (*British Railways*); THORHAG, BLEE, DU PLESSIS (*South African Railways and Harbours*); CREM, JOHANNESSON, KRISTENSEN (*Danish State Railways*), the REPORTERS and the CHAIRMAN took part :

Mr. BLEE said that the advantages obtained by Great Britain upon the direct transfer of the packages on arrival from the wagons to the delivery vans was doubled : saving in handling and in space.

Mr. DORJEE was a little apprehensive about this method of working which does not allow the delivery staff to exercise full control over the goods entrusted to them.

Mr. BLEE replied that in Great Britain it had not been found that there was any serious inconvenience and Mr. SOULARD, *President*, confirmed this statement by quoting the case of France where they also had given up any control of the packages between the handling staff and the delivery

staff without coming up against any disadvantages.

The difficulties encountered by the delivery services for the delivery of parcels in large towns and particularly to big blocks of flats was then brought up; delegates from Sweden, Belgium and Denmark mentioned the methods adopted in their respective countries for coping with these difficulties.

— Summary No. 28 was adopted as follows :

« 28. The conditions under which goods are transferred to the haulage services are linked up with the delivery methods used.

« Most often the parcels are loaded onto the delivery vehicles in the opposite order to that of the delivery round.

« In general, the delivery man being the one who best knows the round executes the loading :

« — either — usually — by collecting parcels already sorted by the railway staff and put into the bays allocated to the different areas of the town;

« — or by calling out the parcels which they have on their documents which are then conveyed by the depot staff from the place where they have been stored to the delivery vehicle.

« Exceptionally, the parcels are loaded into the haulier's vehicle immediately (which implies the use of sparsely loaded trucks); in this case the depot staff can load the parcels as soon as they come in directly on these trucks, thus reducing handling and the area of covered platform required for arrivals.

« On the departure side, the hauliers

are rarely required to classify the parcels. This is only done in stations with multiple forwarding areas for different destinations, or when there is only a very limited time to dispatch the parcels in a given direction.

« One special case is that of the depots without platforms of certain Administrations; when the road vehicles can come in already sorted, the loads can be taken directly to the wagons.

#### *Summary No. 29 :*

29. From the technical point of view the haulage vehicles should be able to pick up and distribute heavy parcels, small containers and pallets.

From the point of view of handling operations at client's premises where no platforms are available, the solutions tried : small cranes mounted on the lorries, elevating tail boards, low-loading trailers, etc., are encouraging but not always completely satisfactory.

— Adopted without modification.

### *Chapter VI : Palletization.*

#### *Summary No. 30 :*

30. Apart from its use as a method of conveying the parcels within the depots, the pallet can be used to carry goods either during their transport in the wagons (internal palletization on the railway), or throughout the whole transport chain from the premises of the consignor to those of the consignee (general palletization).

General palletization, although it is recognised as the most advantageous, is so far the general practice in only a few countries.

Somewhat more numerous are the Administrations applying internal palletization on their railways or developing it.

However, apart from certain countries where the cost of labour is relatively low, the great majority of Administrations are interested in and have undertaken studies of palletization.



Mr. DISCRY drew attention to the interest in general palletization and to the fact that internal palletization on the railway, to which a certain number of countries had put a stop, is only one stage towards general palletization which to be put into effect requires the development of this technique amongst the clientele.

— Summary No. 30 was adopted as follows :

« 30. Apart from its use as a method of conveying the parcels within the depots, the pallet can be used to carry goods either during their transport in the wagons (internal palletization on the railway), or throughout the whole transport chain from the premises of the consignor to those of the consignee (general palletization).

« General palletization is recognised as the most advantageous; however, as it necessitates the co-operation of the clientele it is as yet, practised on a large scale in only a few countries.

« More numerous are the countries which, whilst pursuing this objective, practise or develop internal palletization on their railway.

« The great majority of Administrations have undertaken studies or trials of palletization. »

#### *Summary No. 31 :*

31. Those Administrations who have some experience of internal palletization on the railway, or of general palletization, stress the advantages of the pallet for the transport of heavy parcels or grouped consignments; they are of an opinion that palletization has made it possible to obtain :

- a very marked improvement in the quality of transport (speeding up the dispatch, reducing damage and loss);
- great saving in labour.

— less fatigue for the staff and fewer accidents during handling.

In addition, general palletization enables clients :

- to make savings in handling during the consigning and delivery of goods;
- to facilitate and render the storing of goods more economical;
- to use lighter packing when box-pallets are used.

Mr. TRIBELHORN confirmed his conviction that to get from palletization good technical and financial results, considerable importance must be attached to the training of the staff at all levels.

Mr. WENDLER referred to the experience of the Deutsche Bundesbahn where it has been found that buildings which are well adapted to palletization make it possible to obtain economies in handling, a result which is not obtained if the buildings are not well adapted (as in the case of old buildings) which have not been converted.

Mr. THORHAG mentioned that the use of stacking pallets like that of box pallets offers the advantage of permitting lighter packing.

— Summary No. 31 was adopted as hereafter :

« 31. Those Administrations who have some experience of internal palletization on the railway, or of general palletization, stress the advantages of the pallet for the transport of heavy parcels or grouped consignments; they are of an opinion that palletization has made it possible provided that the staff is suitably trained to obtain :

« — a very marked improvement in the quality of transport (speeding up the dispatch, reducing damage and loss);

« — saving in labour;  
 « — less fatigue for the staff and fewer accidents during handling.

« In addition, general palletization enables clients :

« — to make savings in handling during the consigning and delivery of goods;

« — to facilitate and render the storing of goods more economical;

« — to use lighter packing when box-pallets or stacking pallets are used.

#### *Summary No. 32 :*

32. Palletization must be debited with :

- the additional costs due to the purchase of the pallets and the equipment used to handle them, as well as the corresponding maintenance costs;
- the cost of labour for stowing the parcels on the pallets and in the boxpallets, which stowing has to be done with great care;
- the increase in the dead weight to be carried by rail and road;
- any transport of empties.

— This text was adopted after cancellation of the word « any » in the last line :

#### *Summary No. 33 :*

33. The influence of palletization on the average load of wagons is controversial; many countries still have insufficient experience and the estimates which could be made also depend upon the average load of the wagons before palletization. Certain countries have found that there is a reduction in the average load but consider that this does not lead to any major disadvantage provided the runs are not too long.

It is essential to stack the pallets in order to get good loads.

On the other hand, the use of the pallet may favour a good use of the wagons by making it possible to tranship as well as store economically :

- the reduction in the cost of transhipment operations may make it possible to give up certain traffic by direct wagons of small or average tonnage;
- the easy storing on departure may make it possible to run through-wagons for the long distance services with little traffic at longer intervals (every other day or three times a week) with full loads.

Mr. WYRZYKOWSKI (*Polish State Railways*) said that the measures to which he had referred in Summary No. 33 (stacking of pallets in particular) leads only to a better use of the capacity of the stock without improving its turnround.

— Summary No. 33 was adopted after alteration of the 2nd paragraph as follows:

« It is essential to stack the pallets in order to get good use of the capacity of the stock. »

#### *Summary No. 34 :*

34. The proportion of traffic that is palletizable is high; countries where internal palletization on the railway is the current practice estimate that it can cover 70 % or even more of the traffic.

However, the number of small parcels, light parcels and unpacked parcels as well as their heterogeneity from the point of view of types of packings used gives rise to problems which are being solved :

- either by fastening the loads placed on ordinary pallets (very careful arrangement of the parcels in brickwork fashion, hooping, sticking, adhesive tape, etc.);
- or by using box-pallets.

However, box-pallets are costly and the economic results of palletization are the better, the more simple pallets can be used, which would be facilitated by a rational standardisation of packings.

— Adopted without alteration.

#### *Summary No. 35 :*

35. From the point of view of carrying out the railway transport, there should only

be a few types of pallets, which should all have the same basic dimensions to make stacking possible.

These basic dimensions result from the interior dimensions of the wagons.

The pallets must be firmly constructed to be able to withstand the numerous handling and transport operations they will have to undergo.

However, in some countries there is a tendency to use more fragile soft woods for simple pallets, owing to the national timber resources.

Box-pallets are generally made of metal and have embedded ridges on top to allow them being stacked. Some are collapsible, but these are more fragile and expensive.

There are three types of open box-pallets :

- rigid box-pallets with V shaped opening;
- rigid box-pallets with collapsible sides;
- box-pallets with removable sides.

Closed box-pallets are replacing with advantage the small containers formerly used both in inland and international services (transport of bonded goods).

In regard to Summaries No. 35 and 40, Mr. THORHAG drew attention to the interest in having the basic dimensions of pallets always the same regardless of type.

— Summary No. 35 was adopted as follows :

« 35. From the point of view of carrying out the railway transport, there should only be a few types of pallets, which should all have unified basic dimensions.

« These basic dimensions result from the interior dimensions of the wagons.

« The pallets must be firmly constructed to be able to withstand the numerous handling and transport operations they will have to undergo.

« Box-pallets are generally made of metal and have embedded ridges on top to allow them being stacked. Some are

collapsible, but these are more fragile and expensive.

« There are three types of open box-pallets :

« — rigid box-pallets with V shaped opening;

« — rigid box-pallets with collapsible sides;

« — box-pallets with removable sides.

« Closed box-pallets are replacing with advantage the small containers both in inland and international services (transport of bonded goods). »

#### *Summary No. 36 :*

36. Palletization has been favourably received by the staff; in particular the staff responsible for loading the pallets has clearly understood that the delicate job entrusted to them relieves the efforts of the staff responsible for handling operations.

— Adopted with a slight alteration as follows :

« 36. Palletization has been favourably received by the staff; in particular the staff responsible for loading the pallets has clearly understood that the delicate job entrusted to them relieves the physical efforts of the staff responsible for handling operations. »

#### *Summary No. 37 :*

37. It is difficult to draw up any balance sheet for palletization, but on the whole those Administrations with sufficient experience of this technique consider that it is economically justified as far as the railways are concerned.

In addition, palletization is a means of considerably reducing handling at a time when in many countries there is difficulty in recruiting staff for work of this kind.



The above Administrations are also persuaded of the value of palletization in the field of the general economy and of the development of this technique in commerce and industry. It is important therefore that the railway, being already in a position to profit from this development by reason of the favourable characteristics of its stock, should strengthen this favourable initial position as regards competition by taking all possible suitable commercial steps.

— Adopted without modification.

#### *Summary No. 38 :*

38. In order to assist consignors who are palletizing their consignments and taking into account the benefits the Administrations draw from this, the latter have introduced a certain number of tariff measures :

- the tare of the pallets is not taken into account in determining the weight of the load to be charged, a weight limit being laid down;
- attractive rates for client's pallets returned empty;
- railway pallets are supplied free of charge or at a small hire.

Some of these advantages are scaled down in such a way as to favour clients using pallets of a type similar to those adopted by the Railway Administrations themselves.

Moreover upper and lower weight-limits have been laid down, on the one hand to take into account the power of the handling equipment and on the other, to obtain a sufficient load.

— Adopted without alteration.

#### *Summary No. 39 :*

39. In order to reduce the systematic empty returns of client's pallets all Administrations have set up or are considering setting up pallet pools.

This makes it essential for those concerned to use pallets absolutely identical with those belonging to the railway.

The periods within which the compensation of supply and return must be effected are laid down by agreement. Certain Administrations accept the principle of immediate compensation which, whilst

being favourable for clients, also has certain advantages for the railway at times.

— Adopted without modification.

#### *Summary No. 40 :*

40. In view of the development of international traffic, many Administrations are of an opinion that the exchange of palletized loads transported under this regime should be facilitated and even that pools should be set up, in order to reduce the traffic of empty pallets.

This measure would also make it possible to extend the sphere of action and value of the national pools already set up and to facilitate frontier crossings (handling and customs operations). International pools, however, like pools with clients, imply standardisation of the types of pallets used and agreements in this connection are in the course of preparation.

— This Summary was adopted as given hereafter :

« 40. In view of the development of international traffic, the general opinion of Administrations is that the exchange of palletized loads transported under this regime should be facilitated and even that pools should be set up, in order to reduce the traffic of empty pallets.

« This measure would also make it possible to extend the sphere of action and value of the national pools already set up and to facilitate frontier crossings (handling and customs operations). International pools, however, like pools with clients, imply standardisation of the types and dimensions of pallets used; agreements in this connection are in the course of preparation. »

The discussion on the Summaries of Question 5 being terminated the CHAIRMAN thanked the Delegates and closed the meeting at 12.30 p.m.

— The complete text of the Summaries adopted is given hereafter :

## SUMMARIES.

### I. General observations.

« 1. The relative importance of the  
« parcels traffic differs appreciably from  
« one country to another. It is linked  
« up with the economic and social struc-  
« ture of each country and also, natu-  
« rally, with the general organisation of  
« its transport.

« Each Administration must not over-  
« look such parallelism, as the evolution  
« of these structures affects the parcels  
« traffic and requires decisions to be  
« reached concerning the organisation  
« and measures of adaptation to be  
« taken.

« 2. The permanent objective to be  
« aimed at is to improve the parcels  
« traffic both as regards quality (rapidity  
« and regularity of transport, no da-  
« mage, door-to-door transport) and  
« costs.

« In this connection it is essential :

- « — to reduce handling operations;
- « — to mechanise such handling;
- « — to make good use of the wagons.

« 3. The « classic » type of organisa-  
« tion into regions and regional centres,  
« based on the advantages gained by the  
« concentration of the parcels (by road  
« and by rail) at a reduced number of  
« transit points and the making up of  
« long distance through-wagons is adopt-  
« ed by all the Administrations of some  
« importance.

« It limits the number of stages and  
« makes it possible, if the regional cen-  
« tres coincide with localities having an  
« important traffic of their own, to  
« transport a large number of parcels  
« directly without transhipment.

4. In order to have regular through  
« services, it is advantageous to run  
« them two or three times a week or to  
« operate them with road vehicles.

« However, in particular, it is impos-  
« sible for very extensive railway sys-  
« tems — unless they consent to an  
« inexcusable waste of rolling stock —  
« to operate regular through services  
« between all their regional centres.  
« Intermediate transhipments are un-  
« avoidable for a certain number of  
« long-distance consignments. It is ad-  
« vantageous to concentrate them into a  
« small number of selected and suitably  
« equipped points.

« It is of advantage if such points  
« coincide with the regional centres.

« 5. Within the framework of the  
« classic organisation, a free hand can  
« to some extent be given to the stations  
« to run other wagons than regular ones.  
« The conditions under which such  
« wagons are put in operation must be  
« linked up with the length of the runs  
« they have to make; the longer the run  
« the more necessary it is to get suffi-  
« cient use of such wagons.

« This method, which can be used by  
« all the consigning stations, makes it  
« possible to avoid transhipments (tran-  
« shipment at the centre station of the  
« departure region or even at the centre  
« station of the arrival region).

« Certain Administrations use this  
« method in the transshipment stations  
« as well, but the rational use of such  
« wagons then presupposes a preliminary knowledge of the actual traffic :

« — either by a preliminary storing  
« of the parcels on the platforms, which  
« involves additional handling;

« — or by preparing the work of the  
« depots concerned from the waybills  
« when these are sent with the wagons  
« or by a parcels traffic planning.

« 6. Certain Administrations use the  
« transport documents to regulate the  
« forwarding of the parcels. Carried  
« out in somewhat various ways, such an  
« organisation makes it easier to :

« — determine the cause and responsibility in case of delay, loss or damage;

« — organise and control the handling operations.

« In other countries, the transport documents are forwarded separately and are only checked against the parcels on arrival. Such an arrangement simplifies and appreciably speeds up the loading and unloading of the wagons at departure or en route.

« 7. In many countries, the checking at departure and arrival has been considerably simplified in order to speed up the work and reduce costs.

## II. Goods depots.

« 8. In depots where no transshipments take place, it is recommended that there should be areas for the handling of incoming and outgoing goods under one roof.

« This arrangement makes it possible  
« to reduce the staff required for  
« handling, and facilitates the supply of  
« empty stock (wagons and pallets) to the « outgoing » area.

« It may make it possible to deal with  
« seasonal variations in the traffic by  
« extending one area at the expense of  
« the other, or even exceptionally, provided door to door deliveries are carried out immediately by the delivery service, to use the same area for both purposes : handling at arrival in the morning and forwarding in the evening.

« In the interest of the customers, it is desirable to avoid forwarding in separate buildings allocated to different destinations.

« 9. In stations with a transshipment area, especially in the regional centres, it is advantageous, in order to obtain a greater concentration of parcels, to juxtapose :

« — the « transshipment » and « arrival » or « transshipment » and « departure » areas, according to the amount of traffic that can be combined in this way;

« — or even, better still, to combine all the areas into a « single depot ».

« 10. Railway depots must be, as far as possible :

« close to the industrial and commercial areas of the towns they serve;  
« have convenient road access and a long road frontage which can be extended should the road services eventually be further developed;

« and have easy connection by rail with the reception and formation sidings.



« ings for the parcels trains; for this  
« purpose the marshalling yard should  
« be as close as possible to the depots.

« 11. Most of the depots with small  
« or average traffic are so designed that  
« they have an extensive length and can  
« be served by a single siding, or two  
« at the most.

« Large depots, especially those which  
« include a transshipment area must, on  
« the other hand, be planned on com-  
« pact lines so as to reduce the distance  
« goods have to be conveyed over; they  
« are therefore always served by several  
« sidings.

« Arrangements which include dead-  
« end sidings and a platform at right  
« angles to them avoid the operations  
« of conveying the goods and bringing in  
« or taking away wagons interfering with  
« each other.

« 12. When it is necessary to cross  
« over the sidings to get from one plat-  
« form to another (as in the case of very  
« long platforms or depots served from  
« both ends), the goods can be handled  
« by going through the wagons or else,  
« use can be made of flat wagons ar-  
« ranged for this purpose, or finally in  
« the case of large installations, fixed  
« bridges with a moveable deck can be  
« used.

« 13. The design, space required and  
« division of the handling areas depend  
« mainly upon the following factors :

« — the amount of goods to be  
« handled and the relative volume of the  
« peak traffic;

« — the ratio in amounts of incom-  
« ing, outgoing and transshipment goods;

« — the number of destinations over  
« which the traffic is spread and the  
« number of delivery zones;

« — the existence of collection and  
« delivery services belonging to or at-  
« tached to the railway;

« — the system of dispatch;

« — the method of working adopted  
« with or without mechanisation of  
« handling operations.

« 14. The most generally prevailing  
« tendency as regards the layout of the  
« different areas in the large depots can  
« be summed up as follows :

« — « consigning » areas limited to  
« the space necessary for accepting, and  
« if necessary, sorting parcels before  
« conveying them to the wagons;

« — extensive « arrivals » areas be-  
« cause of the space needed for the  
« storage of the parcels pending delivery.

« It should be noted that :

« — when goods are collected at the  
« station much more room is needed  
« than when they are home-delivered;

« — the space required for the stor-  
« age of parcels at the end of the week,  
« which parcels cannot be delivered be-  
« cause the shops are closed is generally  
« becoming greater and greater owing to  
« the social evolution taking place.

« As regards the platforms serving the  
« sidings, their width varies dependent  
« on the mechanisation of the handling  
« and the amount of goods to be put  
« onto the platforms before being loaded  
« into the wagons.

« 15. The development of mechan-  
« ised handling makes it necessary to

« see that there are no obstacles on the  
« platforms and that these have good  
« running surfaces.

« In nearly every country the height  
« of the platforms corresponds with that  
« of the floors of railway vehicles  
« (1.15 m to 1.2 m = 3' 9 3/8" to  
« 3' 11 1/4"), so that goods are handled  
« on the same level.

« There are difficulties on the road  
« side in every case, since the floors of  
« private lorries and delivery vehicles  
« are at very varying levels.

« In order to handle heavy parcels,  
« pallets and small containers, in spite  
« of such differences in level, certain  
« Administrations use fixed bridges or  
« moveable ones operated by jacks.

« In this connection some standar-  
« disation of the different categories of  
« road vehicles would be advisable.

### III. Traditional handling.

« 16. The wheelbarrows, stillages and  
« hand trucks commonly used in the  
« small stations are also adequate equip-  
« ment in the large depots for all han-  
« dling of goods of low weight or small  
« size within a limited radius of action.

« 17. In the large depots, when the  
« goods have to be conveyed over longer  
« distances, it is essential, in order to  
« reduce costs, to group the parcels into  
« larger units for internal transport and  
« to mechanise their conveyance.

« This is effected by loading them  
« onto power trucks, or on trailers or  
« semi-trailers which are then coupled  
« to tractors. Some countries also make  
« use of overhead or underground trac-

« tion-chains to which trucks are  
« coupled. Belt conveyors are rarely  
« used to move the parcels in this way.

« 18. Assembling quantities of par-  
« cels for grouped handling generally  
« implies their preliminary sorting per  
« destination.

« In the large depots, where the par-  
« cels are grouped for many different  
« directions, it is generally necessary to  
« set up several special sorting areas,  
« which involves additional handling.

« These operations can also be carried  
« out by making a preliminary simpli-  
« fied sorting of the parcels and by  
« using « distributing trucks », which  
« are in fact mobile platforms running  
« alongside the wagons to be loaded in  
« the yards (depots without platforms).

« 19. The sorting of parcels can be  
« facilitated :

« — in the area in which the wagons  
« are unloaded, by using slat-conveyors  
« or unloading machines;

« — in the area where small parcels  
« are sorted, by using conveyor belts.

« 20. With a few rare exceptions, the  
« special handling equipment is used in  
« particular where heavy parcels are  
« concerned.

« In the large depots the movable  
« hoists formerly used for this purpose  
« are being replaced to an increasing  
« extent either by fork lift trucks, or, in  
« the case of very heavy parcels which  
« are not loaded outside the shed by 1 t  
« to 3 t mobile cranes working inside the  
« shed, or large-capacity fork lift trucks.

#### IV. Handling by means of pallets.

« 21. When used for moving parcels  
« in the depots the pallet has the follow-  
« ing advantages :

« the handling of heavy parcels which  
« is difficult with truck on account of  
« their inevitable loading height is faci-  
« litated;

« the pallet provides a means of stor-  
« age for the parcels either by stacking  
« the pallets or by placing them on  
« racks; the use of pallets is therefore  
« extremely advantageous in depots  
« where space is scarce.

« 22. To be economic, handling and  
« conveyance should be carried out :

« over short distances, by hand pallet  
« trucks on simple rollers or, better still,  
« of the bogie type, or by pedestrian-  
« controlled power fork lift trucks;

« in the case of moderate distances  
« (50 to 150 m = 55 to 165 yds.) by  
« rider-controlled fork-lift trucks;

« for longer distances, by trains con-  
« sisting of lift trucks and trolleys. The  
« fork lift trucks can then be used as  
« tractors if they are powerful and fast  
« enough. Traction chains can also be  
« used for this, hauling either trolleys  
« loaded with pallets or hand operated  
« fork lift trucks which are loaded.

« 23. The fork lift trucks have in-  
« ternal combustion engines or electric  
« motors.

« The purchase price of the former  
« is lower, but the operational costs are  
« higher. In general, they are faster so  
« that they are likely to be preferred in  
« depots of extensive length; the Admi-  
« nistrations using them do not report

« any serious trouble arising from ex-  
« haust gases.

« The characteristics of the fork lift  
« trucks depend on the dimensions of  
« the pallets used and those of the  
« vehicles to be served (width of the wa-  
« gons, width and height of the door-  
« ways, etc.).

« The load which they can handle is  
« limited by the strength of the wagon  
« floors; it seems to be correct that a  
« load of 1 t is sufficient for most Rail-  
« way Administrations.

« Mention should be made of the use  
« of devices with mobile forks or mobile  
« lift-frames (adjustable or retractable)  
« intended to facilitate the manoeuvres  
« of the empty or loaded equipment.

« 24. Many Administrations would  
« like to be able to buy for their small  
« depots, simpler and cheaper hand  
« pallet trucks and stackers, in principle,  
« purely mechanically operated.

« Improvements to fork lift trucks  
« from the point of view of their dead  
« weight and manoeuvrability (radius of  
« gyration, size) are also desired.

« 25. If the characteristics of the  
« existing wagons are, in general, suffi-  
« cient for the evolutions of fork lift  
« trucks, a few improvements, as recently  
« decided upon by the Member Admi-  
« nistrations of the I. R. U. (U. I. C.),  
« might nevertheless be considered in the  
« design of future wagons such as :

« increasing the strength of the floor;  
« increasing the width and, if possible,  
« the height of the doorways.

« In this connection, interesting trials  
« have been reported as regards wagons  
« with sliding sides.



## V. Collection and delivery services.

« 26. Many Administrations are interested in collecting and still more in delivering parcels.

« Sometimes these operations are included in the official rates for transport by rail and delivery is often assured either directly or through the intermediary of affiliated companies; if not, the Administrations conclude contracts with private firms in which they reserve the right of control of their services (service-times, charges).

« 27. It is necessary to synchronise the collection and delivery operations and railway timetables. This is particularly important as regards collecting parcels and the departure of the parcels trains.

« As far as arrivals are concerned, the consequences of possible delays on the railway are mitigated by the fact that there are often two delivery rounds a day in the large centres.

« 28. The conditions under which goods are transferred to the haulage services are linked up with the delivery methods used.

« Most often the parcels are loaded onto the delivery vehicles in the opposite order to that of the delivery round.

« In general, the delivery man being the one who best knows the round executes the loading :

« — either — usually — by collecting parcels already sorted by the railway staff and put into the bays allocated to the different areas of the town;

« — or by calling out the parcels which they have on their documents which are then conveyed by the depot staff from the place where they have been stored to the delivery vehicle.

« Exceptionally, the parcels are loaded into the haulier's vehicle immediately (which implies the use of sparsely loaded trucks); in this case the depot staff can load the parcels as soon as they come in directly on these trucks, thus reducing handling and the area of covered platform required for arrivals.

« On the departure side, the hauliers are rarely required to classify the parcels. This is only done in stations with multiple forwarding areas for different destinations, or when there is only a very limited time to dispatch the parcels in a given direction.

« One special case is that of the depots without platforms of certain Administrations; when the road vehicles can come in already sorted, the loads can be taken directly to the wagons.

« 29. From the technical point of view the haulage vehicles should be able to pick up and distribute heavy parcels, small containers and pallets.

« From the point of view of handling operations at client's premises where no platforms are available, the solutions tried : small cranes mounted on the lorries, elevating tail boards, low-loading trailers, etc., are encouraging but not always completely satisfactory.

## VI. Palletization.

« 30. Apart from its use as a method of conveying the parcels within the

« depots, the pallet can be used to carry  
« goods either during their transport in  
« the wagons (internal palletization  
« on the railway), or throughout the  
« whole transport chain from the pre-  
« mises of the consignor to those of the  
« consignee (general palletization).

« General palletization is recognised  
« as the most advantageous; however, as  
« it necessitates the co-operation of  
« the clientele, it is as yet, practised on  
« a large scale in only a few countries.  
« More numerous are the countries  
« which, whilst pursuing this objective,  
« practise or develop internal palletiza-  
« tion on their railway.

« The great majority of Administra-  
« tions have undertaken studies or trials  
« of palletization.

« 31. Those Administrations who have  
« some experience of internal palletiza-  
« tion on the railway, or of general pal-  
« letization, stress the advantages of the  
« pallet for the transport of heavy par-  
« cels or grouped consignments; they  
« are of an opinion that palletization has  
« made it possible provided that the staff  
« is suitably trained to obtain :

« — a very marked improvement in  
« the quality of transport (speeding up  
« the dispatch, reducing damage and  
« less);

« — saving in labour;  
« — less fatigue for the staff and  
« fewer accidents during handling.

« In addition, general palletization  
« enables clients :

« — to make savings in handling  
« during the consigning and delivery of  
« goods;

« — to facilitate and render the stor-  
« ing of goods more economical;

« — to use lighter packing when box-  
« pallets or stacking pallets are used.

« 32. Palletization must be debited  
« with :

« — the additional cost due to the  
« purchase of the pallets and the equip-  
« ment used to handle them, as well as  
« the corresponding maintenance costs;

« — the cost of labour for stowing  
« the parcels on the pallets and in the  
« box-pallets, which stowing has to be  
« done with great care;

« — the increase in the dead weight  
« to be carried by rail and road;

« — transport of empties.

« 33. The influence of palletization  
« on the average load of wagons is con-  
« troversial; many countries still have  
« insufficient experience and the esti-  
« mates which could be made also de-  
« pend upon the average load of the  
« wagons before palletization. Certain  
« countries have found that there is a  
« reduction in the average load but con-  
« sider that this does not lead to any  
« major disadvantage provided the runs  
« are not too long.

« It is essential to stack the pallets  
« in order to get good use of the capa-  
« city of the stock.

« On the other hand, the use of the  
« pallet may favour a good use of the  
« wagons by making it possible to trans-  
« ship as well as store economically :

« — the reduction in the cost of tran-  
« shipment operations may make it pos-  
« sible to give up certain traffic by direct  
« wagons of small or average tonnage;  
« — the easy storing on departure  
« may make it possible to run through-

« wagons for the long distance services  
« with little traffic at longer intervals  
« (every other day or three times a  
« week) with full loads.

« 34. The proportion of traffic that is  
« palletizable is high; countries where  
« internal palletization on the railway is  
« the current practice estimate that it  
« can cover 70 % or even more of the  
« traffic.

« However, the number of small parcels,  
« light parcels and unpacked parcels as  
« well as their heterogeneity from the  
« point of view of types of packings  
« used gives rise to problems which are  
« being solved :

« — either by fastening the loads  
« placed on ordinary pallets (very careful  
« arrangement of the parcels in brickwork  
« fashion, hooping, sticking, adhesive  
« tape, etc.);

« — or by using box-pallets.

« However, box-pallets are costly and  
« the economic results of palletization  
« are the better, the more simple pallets  
« can be used, which would be facilitated  
« by a rational standardisation of packings.

« 35. From the point of view of carrying  
« out the railway transport, there should  
« only be a few types of pallets, which  
« should all have unified basic dimensions.

« These basic dimensions result from the  
« interior dimensions of the wagons.

« The pallets must be firmly constructed  
« to be able to withstand the numerous  
« handling and transport operations they  
« will have to undergo.

« Box-pallets are generally made of

« metal and have embedded ridges on  
« top to allow them being stacked.  
« Some are collapsible, but these are  
« more fragile and expensive.

« There are three types of open box-pallets :

« rigid box-pallets with V shaped  
« opening;

« — rigid box-pallets with collapsible  
« sides;

« — box-pallets with removable sides.

« Closed box-pallets are replacing  
« with advantage the small containers  
« both in inland and international services  
« (transport of bonded goods).

« 36. Palletization has been favourably  
« received by the staff; in particular  
« the staff responsible for loading the  
« pallets has clearly understood that the  
« delicate job entrusted to them relieves  
« the physical efforts of the staff responsible  
« for handling operations.

« 37. It is difficult to draw up any  
« balance sheet for palletization, but on  
« the whole those Administrations with  
« sufficient experience of this technique  
« consider that it is economically justified  
« as far as the railways are concerned.

« In addition, palletization is a means  
« of considerably reducing handling at  
« a time when in many countries there  
« is difficulty in recruiting staff for work  
« of this kind.

« The above Administrations are also  
« persuaded of the value of palletization  
« in the field of the general economy  
« and of the development of this technique  
« in commerce and industry. It is  
« important therefore that the railway,



« being already in a position to profit  
 « from this development by reason of  
 « the favourable characteristics of its  
 « stock, should strengthen this favourable initial position as regards competition by taking all possible suitable commercial steps.

« 38. In order to assist consignors  
 « who are palletizing their consignments  
 « and taking into account the benefits  
 « the Administrations draw from this,  
 « the latter have introduced a certain  
 « number of tariff measures :

« — the tare of the pallets is not  
 « taken into account in determining the  
 « weight of the load to be charged, a  
 « weight limit being laid down;

« — attractive rates for client's pallets  
 « returned empty;

« — railway pallets are supplied free  
 « of charge or at a small hire charge.

« Some of these advantages are scaled  
 « down in such a way as to favour  
 « clients using pallets of a type similar  
 « to those adopted by the Railway Administrations themselves.

« Moreover upper and lower weight-  
 « limits have been laid down, on the  
 « one hand to take into account the  
 « power of the handling equipment and  
 « on the other, to obtain a sufficient  
 « load.

« 39. In order to reduce the systematic empty returns of client's pallets all Administrations have set up or are considering setting up pallet pools.

« This makes it essential for those  
 « concerned to use pallets absolutely  
 « identical with those belonging to the  
 « railway.

« The periods within which the compensation of supply and return must be effected are laid down by agreement. Certain Administrations accept the principle of immediate compensation which, whilst being favourable for clients, also has certain advantages for the railway at times.

« 40. In view of the development of international traffic, the general opinion of Administrations is that the exchange of palletized loads transported under this regime should be facilitated and even that pools should be set up, in order to reduce the traffic of empty pallets.

« This measure would also make it possible to extend the sphere of action and value of the national pools already set up and to facilitate frontier crossings (handling and customs operations). International pools, however, like pools with clients, imply standardisation of the types and dimensions of pallets used; agreements in this connection are in the course of preparation. »

— The Plenary Meeting ratified these Summaries during its meeting of the 3rd October 1958.

## QUESTION 6.

**When changing over to electric and Diesel traction for passenger train services, research of the principles which may lead to a rational and efficient organisation of same.**

**For this purpose to :**

— **work on the social and economic needs and with this object in view,**

classify the passenger services according to the needs of the populations served, the distances, the volume of passenger traffic and its variations;

- fix, for each category, the traffic hours and advisable frequencies as well as the reasonable requirements of the public for comfort and speed;
- define the most suitable methods to draw up the timetables (including eventually regular interval train services) : choice of the type of train and rolling stock, fixing the runs.

#### Preliminary documents.

Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Union of Soviet Socialist Republics, Viet-Nam and Yugoslavia), by R. CARLIER. (See *Bulletin* for February 1958, p. 85.)

Report (America [North and South], Australia [Commonwealth of], Burma, Ceylon, Egypt, India, Iraq, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by G. F. FIENNES. (See *Bulletin* for February 1958, p. 111.)

Special Report, by G. F. FIENNES. (See *Bulletin* for September 1958, p. 1409.)

#### Report of Section III.

(See the *Congress Daily Journal* : No. 4, p. IV and IX; No. 6, p. V and X; and No. 7, p. XIII.)

#### Meeting held on the 2nd October 1958.

The meeting was opened at 9.30 a.m. by Mr. SOULARD, *President*.

The PRESIDENT congratulated for the work which they had done the *Reporters* : Messrs. CARLIER and FIENNES; then he invited the latter to speak.

Mr. FIENNES, *Special Reporter*, recalled that the object of Question 6 was to bring out the general principles of a rational passenger service.

The CHAIRMAN then invited discussion of the texts of the summaries.

#### *Summary No. 1 :*

1. A passenger service by rail is a great advantage for the population of every country and an absolute necessity for many. The habit of travelling is increasing. The services must be adapted to the development of the public demand, whilst being kept within the reasonable standards of sound management.

Mr. SCHERMAN (*Swedish State Railways*) pointed out that in his country the development of the private car is such that the passenger traffic and particularly the short distance traffic has been steadily decreasing for several years, contrary to what has been happening in the large majority of the other countries. In its efforts to remedy this situation, his Administration has, since February 1958, tried the following scheme : impersonal tickets for ten journeys at a reduced rate have been issued over two sections of line serving important towns which are fairly close together. It was soon seen that the fall in traffic had been stopped and that the receipts had risen.

Mr. SCHERMAN said that he would like to see some allusion in Summary No. 1 to the situation in those countries where the passenger traffic had dropped.

The REPORTERS and the CHAIRMAN were rather of the opinion that these exceptional cases ought to be dealt with in a separate summary for which a draft text was requested.

Mrs. BESTCHEVA (*U.S.S.R. Railway Transport Ministry*) then quoted some figures which illustrated the development of passenger services in her country; however, she thought that over distances of several thousand kilometres large jet aircraft would not be long in taking the lead from the railways.

— The text of Summary No. 1 will be again considered during the next meeting.

#### *Summary No. 2 :*

2. The principles on which a rational and efficient passenger service is based can be summed up in the words : convenience, reliability, speed, comfort, and cheapness. Within the framework of these principles, the change to electric and diesel traction is a favourable opportunity of re-organising the services for the benefit of both the travelling public and the railway.

Following a request for information from Mr. DU PLESSIS (*South African Railways*), some particulars were given by the REPORTERS and by Mr. SCHERMAN of the reduced tickets for families and of the conveyance of accompanied motorcars, from which it was clear that these services have, generally speaking, had a favourable reception from the public.

Mr. CIRILLO (*Italian State Railways*) said that his Administration, taking account of the increasing relative importance of the 2nd Class clientele, is inclined to allow them to travel on express trains which have previously been reserved for 1st Class passengers.

Mr. CARLIER, *Reporter*, supported by the CHAIRMAN, did not feel that there could be any general rule on this subject, certain sections of line still having a very appreciable 1st Class clientele justifying trains being reserved for them.

— Summary No. 2 was adopted without alteration.

#### *Summary No. 3 :*

3. The capacity to work practically uninterruptedly, the relative rareness of breakdowns in service, the great accuracy in running, the high capacity for acceleration and sustained speed, the ease with which multiple unit rakes can be made up, and their great cleanliness are the main advantages of the new methods of traction which allow of the greater application of the first principles above than is the case with steam traction.

Amendments in the text which were proposed by Mr. WYRZYKOWSKI (*Polish Railways*) and Mr. SCHERMAN, were adopted in agreement with the REPORTERS.

— Summary No. 3 was adopted as follows :

« 3. The capacity to work practically uninterruptedly, the relative rareness of breakdowns in service, the great accuracy in running, the high capacity for acceleration and sustained speed, the ease with which multiple unit rakes can be made up, and their great cleanliness, higher thermic output, greater elasticity in the use of locomotives are the main advantages of the methods of Diesel and electric traction which allow of the greater application of the first principles above than is the case with steam traction. »



*Summary No. 4 :*

4. As a journey is to a large extent a loss of time, one of the main objects of a train service is to minimise this loss, primarily by a judicious selection of the departure and arrival times, and by increasing the number of trains and the average speed.

Mr. SCHERMAN pointed out that his Administration, because of the drop in passenger traffic to which he had already referred, had been led to reduce the frequency of the trains on certain lines.

Messrs. DE BRUIN (*Netherlands Railways*), WECKMANN (*Deutsche Bundesbahn*), and the SPECIAL REPORTER, noted that the case of Sweden is now one of the rare exceptions and that increase in frequency remains an important objective.

Mr. BAUDIER (*French West Africa Railways*), then remarked that the frequency of trains could not be increased without thought being given to the financial repercussions of this operation, whilst Mr. LANGEVIN (*Régie Autonome des Transports parisiens*), said that for urban and sub-urban services, profitability and public service were opposed one to the other.

The CHAIRMAN recalled that the importance of sound management had already been mentioned under the heading of Generalities (Summary No. 1), and had the text of Summary No. 4 adopted without amendment.

*Summary No. 5 :*

5. The selection of the departure and arrival times of the trains must give priority to the following two objectives :

- reduce the impact of the journey on ordinary working hours, and conse-

quently encourage night-time, evening or half-day travel;

- avoid train arrivals and departures between midnight and 6 a.m.

— Adopted without discussion.

*Summaries No. 6 and 7 :*

6. Consequently in the case of journeys lasting more than six hours, considering in turn those routes over which the traffic justifies one, two, three, four ... services a day, the practice followed by the railways shows that it is desirable for the timetables to include in the order given the following trains :

- a night train leaving between 7 p.m. and midnight;
- a day train leaving early in the morning (in the case of journeys taking less than six hours);
- an afternoon train (in the case of journeys taking less than twelve hours);
- one special high speed train at the time most convenient for those using it;
- other trains at hours dictated more particularly by the special conditions on the line.

7. If the journey takes less than six hours :

- the night train will be replaced by an evening train;
- the day trains will leave at hours so chosen that the whole journey can be made in half a day or less, including a meal.

Messrs. WECKMANN and CARDELL (*Swedish State Railways*) proposed slight modifications in the text which were approved without discussion.

— The wording of these two summaries is given hereafter :

« 6. Consequently in the case of journeys lasting more than six hours, considering in turn those routes over which the traffic justifies one, two, three, four... services a day, the practice followed by the

railways shows that it is desirable for the timetables to include in the order given the following trains :

« — a night train leaving between 7 p.m. and midnight;

« — a day train leaving early in the morning (in the case of journeys taking less than sixteen hours);

« — an afternoon train (in the case of journeys taking less than twelve hours);

« — one special high speed train at the time most convenient for those using it;

« — other trains at hours dictated more particularly by the special characteristics of the traffic on the line. »

« 7. If the journey takes less than six hours :

« — the night train will be replaced by an evening train;

« — the day trains will leave at hours so chosen that the whole journey can be made in half a working day or less, including a meal.»

#### *Summary No. 8 :*

8. The choice between a train service organised in groups and continuous services spaced out over the day depends upon many factors, in particular the length of the journey and the number of travellers; as the length of the journey decreases and the number of passengers increases, usually the Group services give way to Continuous services, and in the end to Interval services in extreme cases. This evolution is facilitated by the changeover in traction.

Mrs. BESTCHEVA, after having given some information on the present tendencies of the railways in the U.S.S.R. in regard to the choice to be made between group services and interval services, asked

for mention to be made at the end of Summary No. 8 of the different technical improvements other than the changeover in traction which allows an improvement in the frequency of runs.

— The following text was adopted :

« 8. The choice between a train service organised in groups and continuous services spaced out over the day depends upon many factors, in particular the length of the journey and the number of travellers; as the length of the journey decreases and the number of passengers increases, usually the Group services give way to Continuous services and in the end to Interval services in extreme cases. This evolution is facilitated by changeover in traction, and by the improvement of the railway equipment, particularly by the installation of new tracks, by the installation of the most modern techniques, such as centralisation of the control of points and the amalgamation of signal boxes.

#### *Summary No. 9 :*

9. The Group services are suitable for night services and for trains making important connections (with boat services in particular).

— Adopted without discussion.

#### *Summary No. 10 :*

10. An Interval service loses much of its value if the time between two successive trains is more than two hours.

Mr. NOGUÉS (*Spanish National Railways*) regretted that the proposed text did not bring out the advantages of the interval service which the *Special Report* had mentioned in its paragraphs 12 (in fine), 13 and 14.

Furthermore Messrs. WYRZYKOWSKI and WECKMANN proposed an amendment in the text which would make it more precise, an amendment which was adopted.

— Summary No. 10 therefore is worded as follows :

« 10. An Interval service loses many of its advantages for the passenger if the time between two successive trains is more than 2 hours. »

#### *Summaries No. 11 and 12 :*

11. The structure of intermediate stops depends :

- on the amount of traffic between the two terminal stations of the run;
- on the traffic between the intermediate stations and the terminal stations;
- on the traffic between the intermediate stations themselves.

12. If there is sufficient traffic, it is right to carry the greatest possible number of passengers between the terminals by non-stop trains.

Otherwise the need to provide a reasonable number of trains is the prevailing factor and intermediate stops will ensure that sufficient numbers use the trains.

The changeover to electric and diesel traction makes additional stops that one would have hesitated to make with steam traction more acceptable.

Mr. WYRZYKOWSKI, having asked that mention might be made in these summaries not only of the needs of the public but also of the capacity of the stock used, a discussion occurred, in which Messrs. DISCRY (*Belgian National Railways*), TRIBELHORN (*Swiss Federal Railways*), WECKMANN, SCHERMAN, CREM (*Belgian National Railways*), the REPORTERS and the CHAIRMAN took part, which concluded on the approval of the idea in which the text of the *Special Report* had been drawn up

that is to say, the needs of the public are the essential points to be considered in deciding a programme of intermediate stops.

Mr. WATKINS (*British Transport Commission*), brought up the important question of provision being made for freight train working in the preparation of timetables, but did not insist on an allusion being made to it in the summaries.

— The following texts were adopted :

« 11. The structure of intermediate stops depends on the needs of the clientele between :

« — the two terminal stations of the run;

« — the intermediate stations and the terminal stations;

« — the intermediate stations themselves;

with due regard to the connections to be made. »

« 12. If there is sufficient traffic, it is right to carry the greatest possible number of passengers between the terminals by non-stop trains.

« If there is not sufficient traffic to justify such trains, the need to provide a reasonable number of trains is the prevailing factor and intermediate stops will ensure that sufficient numbers use the trains.

« The changeover to electric and Diesel traction, by reducing loss of time due to stops, makes additional stops that one would have hesitated to make with steam traction more acceptable. »



*Summary No. 13 :*

13. As stops during the night disturb the passengers, the number of stops made by night trains should be reduced to the minimum.

Mr. JOHANNESSON (*Swedish State Railways*), remarked that putting on or taking off vehicles is still more prejudicial to the repose of the passengers than stops without such movement, but did not insist on the proposed text being amended.

— Summary No. 13 was adopted without alteration.

— The CHAIRMAN thanked the Delegates and closed the meeting at 12.30 p.m.

*Meeting held on the 6th October 1958.*

— The meeting was opened at 9.30 a.m.

The Section pursued the examination of Question 6.

*Summaries No. 14 and 15 :*

14. Punctuality is of the greatest importance. The timetables should not promise more than the equipment and staff can reliably perform.

15. Reduction in the journey time is an important factor in increasing traffic, especially over long distances, and in the case of services by day.

The changeover in methods of traction produces undoubted advantages in this connection, even if the maximum speed allowed over the lines in question is not increased.

Such an increase in the maximum speed should only be made after an economic study has been made to ascertain the costs it will involve, the savings it will produce and the increase in receipts which can be expected from it.

Several Administrations report that the great increases in the average speed obtained in this way have been in general profitable.

Messrs. HARBOUR (*London Transport Executive*) and WECKMANN proposed slight amendments to the text which were adopted.

— The modified summaries were worded as indicated below :

« 14. Reliability and punctuality are of the greatest importance. The timetables should not promise more than can be reliably performed.

« 15. Reduction in the journey time is an important factor in increasing and maintaining traffic, especially over long distances, and in the case of services by day.

« The changeover in methods of traction produces undoubted advantages in this connection, even if the maximum speed allowed over the lines in question is not increased.

« Such an increase in the maximum speed should only be made after an economic study has been made to ascertain the costs it will involve and the advantage expected therefrom.

« Several Administrations report that the great increases in the average speed obtained in this way have been in general profitable. »

*Summary No. 16 :*

16. The use of passenger trains for other traffics, in particular to speed up some of the parcels traffic, is only acceptable to the extent that they do not interfere with punctuality and the structure of the passenger timetables.

Mr. SCHERMAN drew attention to the position in Sweden where account must be taken, in the study of timetables, of the requirements of freight and mail, which

are conveyed by certain passenger trains and to the length of certain stops en route which result therefrom.

The CHAIRMAN said that the problem was not one peculiar to Sweden; it was to be encountered on certain lines of many other countries, and the timetables are often a compromise between opposing needs. The text proposed by the REPORTERS, which stresses the requirements of passenger traffic, the most important thing in passenger timetables, in his opinion had to be retained. After an exchange of views in which Messrs. DISCRY and CARLIER participated, this point of view was adopted.

— Summary No. 16 was adopted with a slight alteration: « Some parcels traffic » being replaced by « Some goods traffic ».

#### *Summary No. 17 :*

17. Service stops must be cut down as much as possible, in particular :

- on international services by making it the general practice to carry out customs and police checks during the run;
- on services over lines with different systems of electrification, by using locomotives capable of running on different frequencies and voltages.

Mr. WYRZYKOWSKI expressed the wish that customs and immigration formalities in international trains should not take place during the sleeping time of passengers (from midnight to 6 a.m.).

To this Messrs. DISCRY and WECKMANN replied that such a measure, although desirable, would often be in practice quite impossible.

— Summary No. 17 was adopted without modification.

#### *Summary No. 18 :*

18. The efforts of the railways to improve the standard of comfort offered as a rule should be directed to the following points :

- riding qualities, especially in the case of railcars;
- heating;
- sound insulation;
- forced ventilation and air conditioning;
- lighting;
- design and arrangement of the seats;
- extension of sleeper accommodation on night trains;
- restaurant services (restaurant cars, buffet-cars and trolley services).

The text proposed by the REPORTERS gave rise, firstly, to an exchange of views in which Messrs. CIRILLO, BAUDIER, DISCRY, WECKMANN, KRISTENSEN (*Danish State Railways*), CREM, the REPORTERS and the CHAIRMAN particularly took part, which concluded by two additions to the Reporter's text, which, among the efforts undertaken to increase comfort, made mention of measures relating to :

- interior fitting up of the coaches regardless of the design and arrangement of the seats;
- good interior maintenance and particularly cleaning en route in long distance trains.

In addition, Mr. CIRILLO referred to the high cost of air conditioning plant and expressed the opinion that such plant would not because of this fact, come into general use.

Mr. LANGEVIN gave some detailed information on the new pneumatic tyred stock put into service on certain lines of the *Régie Autonome des Transports Parisiens*

and on the increased comfort obtained from the point of view of :

- the standard of running and suspension;
- sound proofing;
- the number of seats in the off-peak hours.

Mr. DAVIS (*Nigerian Railway Corporation*), drew attention to the importance of having, in long distance trains, particularly during the night, coaches with a central shower compartment.

Mr. KRISTENSEN said how important it was that the type of coaches supplied should correspond with that of the coaches which had been announced, a remark which was approved by all Delegates.

— The following text was adopted as Summary No. 18 :

« 18. The efforts of the railways to improve the standard of comfort offered as a rule should be directed to the following points :

- « — riding qualities;
- « — heating;
- « — sound insulation;
- « — forced ventilation and air conditioning;
- « — lighting;
- « — design and arrangement of the seats;
- « — interior arrangement of coaches;
- « — extension of sleeper accommodation on night trains;
- « — restaurant services (restaurant cars, buffet-cars and trolley services);
- « — general standard of cleaning with particular development of cleaning en route on long runs. »

### *Summary No. 19 :*

19. In the passenger timetables it is important to study the best user of the rolling stock; good user will make operation more economic, making it possible to deal with a larger amount of traffic with a given amount of stock.

Mention was made, on the proposal of Mr. HARBOUR, of the efficient utilisation of train staff; however, Mr. WECKMANN said that in Federal Germany the question of the utilisation of train staff was not taken into consideration at timetable conferences.

— The following text was adopted :

« 19. In drawing up the passenger timetables it is important to study the best user of the rolling stock and of the train crews; good user will make operation more economic, making it possible to deal with a larger amount of traffic with a given amount of stock (coaches and traction) and train crews. »

### *Summary No. 20 :*

20. Tourist traffic is growing to such an extent that the railways have to cope with considerable seasonal peak traffic. The transport of these large numbers of passengers can only be carried out under reasonable conditions of comfort for the passengers and cost for the railway when the traffic is spread out. Although certain results have been obtained by the Administrations (in particular thanks to reduced rates and special trains outside peak hours), the object in view can only be fully attained with the collaboration of private organisations and above all the intervention of the public authorities.

Following a proposal made by Mr. CREM, approved by Mr. CIRILLO, and with which the REPORTERS were fully in accord, special mention was made of the development of social tourism.



An exchange of views then took place in regard to the collaboration of private organisations and to the intervention of the Public Authorities, which it is desirable to obtain in order to effect a spreading of the peak traffic; exchange of views in which Messrs. ARKLE (*British Railways*), DU PLESSIS, CREM, the REPORTERS and the CHAIRMAN participated.

Mr. DU PLESSIS drew particular attention to the action to be taken with the Hotel Associations and the Tourists' Information Bureaux in order to encourage out of season tourist traffic.

The CHAIRMAN gave particulars of the results obtained this summer in France where, following negotiations between the representatives of the Ministry of Labour, representatives of the motorcar industry and its staff, and the S.N.C.F., the dates, on which the large motorcar firms of the Paris area have given holidays to their staff, have been staggered, the first day of the holiday being a Thursday (in conformity with the request of the S.N.C.F.) and not a Friday.

On the suggestion of Mr. DU PLESSIS an addition to the proposed text, dealing with the publicity effort to be undertaken, was then adopted.

— The following text was adopted :

« 20. Tourist traffic in general and social tourism in particular is growing to such an extent that the railways have to cope with considerable seasonal peak traffic. The transport of these large numbers of passengers can only be carried out under reasonable conditions of comfort for the passengers and prime cost

for the railway when the traffic is spread out. Although some Administrations have been able to obtain certain results (in particular thanks to reduced fares and special trains outside peak hours), the object in view can only be fully attained with the collaboration of private organisations and above all the intervention of the public authorities. An active advertising campaign is an integral part of these efforts »

#### *Summary No. 21 :*

21. The daily suburban traffic peaks of the great cities put the railways in the same difficulty.

The changeover from steam traction to electric traction allows the railway to meet further increases in traffic.

Certain railways report, however, cases in which the possibilities of the new techniques are soon exhausted in their turn. Only a spreading out of the peak traffic, again requiring the intervention of the Public Authorities, can then avoid the need for further heavy capital investment.

Mr. LANGEVIN spoke of the possibilities attained by modern techniques to resolve the difficult problems of the daily peaks in suburban traffic :

— use of new stock with increased acceleration and deceleration;

— increase in the number of doors;

— new links across large towns between the lines to the suburbs on either side.

Following his proposal and a supplementary proposal by Mr. DU PLESSIS an amendment of the last paragraph of Summary No. 21 was then adopted.

— Summary No. 21 was then approved as follows :

« 21. The daily suburban traffic peaks

of the great cities put the railways in the same difficulty.

« The changeover from steam traction to electric traction allows the railway to meet further increases in traffic.

« Parallel with the study and application of all new techniques a spreading out of the peak traffic, again requiring the intervention of the Public Authorities, can then avoid the need for further heavy and unprofitable capital investment. »

The PRESIDENT recalled that during the meeting of October 2, it was decided to reconsider the text of Summary No. 1.

The REPORTERS put forward a new text which they had drawn up in agreement with Mr. SCHERMAN, a text which was adopted without discussion.

— Summary No. 1 was worded as follows :

« 1. A passenger service by rail is a great advantage for the population of every country and an absolute necessity for many. The habit of travelling is increasing. The services must be adapted to the development of the public demand, whilst being kept within the reasonable standards of sound management.

« In case where the development of the habit of travel is not translated into an increase in the traffic by rail, it is, possibly, the time to restore the situation by other methods, particularly by a forward policy in fares, before an increase in the service. »

The discussion on the summaries of Question 6 being concluded, the CHAIRMAN thanked the REPORTERS who had accomplished with such success a difficult task in regard to an extremely broad and

complex subject. He also thanked the Assembly for their very interesting and courteous collaboration.

Mr. CREM, in his turn, thanked the CHAIRMAN for the authoritative manner in which he had directed the discussions.

— The CHAIRMAN closed the meeting at 12.30 p.m.

— The complete text of the summaries is given hereafter :

### SUMMARIES.

« 1. A passenger service by rail is a  
« great advantage for the population of  
« every country and an absolute neces-  
« sity for many. The habit of travelling  
« is increasing. The services must be  
« adapted to the development of the  
« public demand, whilst being kept  
« within the reasonable standards of  
« sound management.

« In case where the development of  
« the habit of travel is not translated  
« into an increase in the traffic by rail,  
« it is, possibly, the time to restore the  
« situation by other methods, particu-  
« larly by a forward policy in fares,  
« before an increase in the service.

« 2. The principles on which a ra-  
« tional and efficient passenger service  
« is based can be summed up in the  
« words : convenience, reliability, speed,  
« comfort, and cheapness. Within the  
« framework of these principles, the  
« change to electric and Diesel traction  
« is a favourable opportunity of re-or-  
« ganising the services for the benefit of  
« both the travelling public and the  
« railway.

« 3. The capacity to work practically  
« uninterruptedly, the relative rareness  
« of breakdowns in service, the great  
« accuracy in running, the high capacity  
« for acceleration and sustained speed,  
« the ease with which multiple unit rakes  
« can be made up, and their great clean-  
« liness, higher thermic output, greater  
« elasticity in the use of locomotives are  
« the main advantages of the methods  
« of Diesel and electric traction which  
« allow of the greater application of the  
« first principles above than is the case  
« with steam traction.

« 4. As a journey is to a large extent  
« a loss of time, one of the main objects  
« of a train service is to minimise this  
« loss, primarily by a judicious selection  
« of the departure and arrival times,  
« and by increasing the number of  
« trains and the average speed.

« 5. The selection of the departure  
« and arrival times of the trains must  
« give priority to the following two  
« objectives :

« — reduce the impact of the jour-  
« ney on ordinary working hours, and  
« consequently encourage night-time,  
« evening or half-day travel;

« — avoid train arrivals and depar-  
« tures between midnight and 6 a.m.

« 6. Consequently in the case of jour-  
« neys lasting more than six hours, con-  
« sidering in turn those routes over  
« which the traffic justifies one, two,  
« three, four... services a day, the prac-  
« tice followed by the railways shows  
« that it is desirable for the timetables  
« to include in the order given the fol-  
« lowing trains :

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« 7 p.m. and midnight;

« — a day train leaving early in the  
« morning (in the case of journeys tak-  
« ing less than sixteen hours);

« — an afternoon train (in the case  
« of journeys taking less than twelve  
« hours);

« — one special high speed train at  
« the time most convenient for those  
« using it;

« — other trains at hours dictated  
« more particularly by the special cha-  
« racteristics of the traffic on the line.

« 7. If the journey takes less than six  
« hours :

« — the night train will be replaced  
« by an evening train;

« — the day trains will leave at hours  
« so chosen that the whole journey can  
« be made in half a working day or less,  
« including a meal.

« 8. The choice between a train ser-  
« vice organised in groups and conti-  
« nuous services spaced out over the  
« day depends upon many factors, in  
« particular the length of the journey  
« and the number of travellers; as the  
« length of the journey decreases and  
« the number of passengers increases,  
« usually the Group services give way to  
« Continuous services and in the end to  
« Interval services in extreme cases.  
« This evolution is facilitated by change-  
« over in traction, and by the improve-  
« ment of the railway equipment, par-  
« ticularly by the installation of new  
« tracks, by the installation of the most  
« modern techniques, such as centralisa-  
« tion of the control of points and the  
« amalgamation of signal boxes.



« 9. The Group services are suitable  
« for night services and for trains mak-  
« ing important connections (with boat  
« services in particular).

« 10. An Interval service loses many  
« of its advantages for the passenger if  
« the time between two successive trains  
« is more than 2 hours.

« 11. The structure of intermediate  
« stops depends on the needs of the  
« clientele between :

« — the two terminal stations of the  
« run;

« — the intermediate stations and the  
« terminal stations;

« — the intermediate stations them-  
« selves;  
« with due regard to the connections to  
« be made.

« 12. If there is sufficient traffic, it  
« is right to carry the greatest possible  
« number of passengers between the  
« terminals by non-stop trains.

« If there is not sufficient traffic to  
« justify such trains, the need to provide  
« a reasonable number of trains is the  
« prevailing factor and intermediate  
« stops will ensure that sufficient  
« numbers use the trains.

« The changeover to electric and  
« Diesel traction, by reducing loss of  
« time due to stops, makes additional  
« stops that one would have hesitated  
« to make with steam traction more  
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« 13. As stops during the night dis-  
« turb the passengers, the number of  
« stops made by night trains should be  
« reduced to the minimum.

« 14. Reliability and punctuality are  
« of the greatest importance. The time-  
« tables should not promise more than  
« can be reliably performed.

« 15. Reduction in the journey time  
« is an important factor in increasing  
« and maintaining traffic, especially over  
« long distances, and in the case of  
« services by day.

« The changeover in methods of trac-  
« tion produces undoubted advantages  
« in this connection, even if the maxi-  
« mum speed allowed over the lines in  
« question is not increased.

« Such an increase in the maximum  
« speed should only be made after an  
« economic study has been made to  
« ascertain the costs it will involve and  
« the advantage expected therefrom.

« Several Administrations report that  
« the great increases in the average  
« speed obtained in this way have been  
« in general profitable.

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« other traffics, in particular to speed  
« up some of the goods traffic, is only  
« acceptable to the extent that it does  
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« as much as possible, in particular :

« — on international services by  
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« carry out customs and police checks  
« during the run;

« — on services over lines with dif-  
« ferent systems of electrification, by  
« using locomotives capable of running  
« on different frequencies and voltages.

« 18. The efforts of the railways to

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« offered as a rule should be directed  
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- « — riding qualities;
- « — heating;
- « — sound insulation;
- « — forced ventilation and air conditioning;
- « — lighting;
- « — design and arrangement of the seats;
- « — interior arrangement of coaches;
- « — extension of sleeper accommodation on night trains;
- « — restaurant services (restaurant cars, buffet-cars and trolley services);
- « — general standard of cleaning with particular development of cleaning en route on long runs.

« 19. In drawing up the passenger timetables it is important to study the best user of the rolling stock and of the train crews; good user will make operation more economic, making it possible to deal with a larger amount of traffic with a given amount of stock (coaches and traction) and train crews.

« 20. Tourist traffic in general and social tourism in particular is growing to such an extent that the railways have to cope with considerable sea-

sonal peak traffic. The transport of these large numbers of passengers can only be carried out under reasonable conditions of comfort for the passengers and prime cost for the railway when the traffic is spread out. Although some Administrations have been able to obtain certain results (in particular thanks to reduced fares and special trains outside peak hours), the object in view can only be fully attained with the collaboration of private organisations and above all the intervention of the public authorities. An active advertising campaign is an integral part of these efforts.

« 21. The daily suburban traffic peaks of the great cities put the railways in the same difficulty.

« The changeover from steam traction to electric traction allows the railway to meet further increases in traffic.

« Parallel with the study and application of all new techniques a spreading out of the peak traffic, again requiring the intervention of the Public Authorities, can then avoid the need for further heavy and unprofitable capital investment. »

— The Plenary Meeting ratified these summaries during the Session of the 7th October 1958.

## SECTION IV. — General.

*President* : Dr. H. GSCHWIND.

*Vice-Presidents* : Messrs. P.C. MUKERJEE, R.F. MARRIOTT and W.H. MAASS.

*Principal Secretary* : Mr. P. SCHOONJANS.

### QUESTION 7.

**Advantage of the use of high speed electronic apparatus for certain administrative work such as :**

- 1) the making out of pay slips;
- 2) traffic and stores accounts;
- 3) the checking of the movement of empty and loaded freight wagons, thereby improving the distribution of rolling stock;
- 4) compiling more rapidly already existing statistics, thus having also the possibility of preparing new ones.

#### Preliminary documents.

Report (America [North and South], Australia, [Commonwealth of], Burma, Ceylon, Egypt, India, Iraq, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by Sten UBBE. (See *Bulletin* for April 1958, p. 435.)

Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Viet-Nam and Yugoslavia), by B. H. DE FONTGALLAND. (See *Bulletin* for May 1958, p. 695.)

Special Report by B. H. DE FONTGALLAND. (See *Bulletin* for September 1958, p. 1415.)

### Report of Section IV.

(See the *Congress Daily Journal* No. 2, p. IX; No. 3, p. IX; No. 5, p. I and No. 7, p. XV.

#### Meeting held on the 30th September 1958.

— The meeting was opened at 9.30 a.m.

The PRESIDENT emphasised the interest attached to Question 7, first item on the agenda of Section IV and invited Mr. DE FONTGALLAND (*Special Reporter*) to give a résumé of the principal points dealt with in the Report.

First Mr. DE FONTGALLAND recalled that the experience of the various railway companies in this field was limited and therefore they would deal especially with future possibilities. He then defined the basic characteristics of EDPMs which are :

— firstly, their faculty of carrying out operations of logical character;

— secondly, the possibility of storing the working programme in the machine.

An electronic data processing machine is not therefore an « electronic brain », for it only carries out all the details of a programme drawn up and fixed beforehand. It also provides guidance in making decisions.

These calculating machines, instruments



of management for enterprises of varied nature, possess a universal character. Railway undertakings by reason of the huge volume of their basic data, the extreme diversity of their statistics, the multiplicity and geographical dispersion of their establishments can derive great benefit from these machines.

However, it is evident from the reports received that a minimum of activity is required in order to warrant the use of such calculators on account of their complexity and cost. The introduction of EDPM entails also the problem of liaison and telecommunications.

From the reports it is obvious that so far in practice EDPM have only been used to deal with questions which previously were solved by punched card system. Very little use has been made so far of these machines for dealing with specific rail and transport problems. There appear to be great possibilities in this sphere for such apparatus, and henceforth it should be feasible to find rational solutions to these difficult problems.

Some Administrations propose using EDPM as instruments of centralised management of their network, while others have suggested their employment for the solving of joint problems (tariff charges and rolling stock); all agree that such studies necessitate a great deal of time, are of a complex nature and call for highly qualified staff.

The PRESIDENT then called on Mr. UBBE (*Reporter*) who stated that he fully agreed with Mr. DE FONTGALLAND's summaries. In view of the rapid developments in this field, he requested Delegates to give details about their most recent experiences.

The PRESIDENT then opened the discussion on the various summaries and requested Mr. SCHOONJANS (*Principal Secretary*) to read out in succession the different summaries of the special report.

#### *Summary No. 1 :*

1. In view of the extreme novelty of the subject concerned, the summaries outlined below can only have an informative value. A certain number of Administrations, of varying importance, are already using electronic data processing machines (EDPM) or are engaged in preliminary studies and have placed orders. So far, however, experience is not sufficient to warrant definitive conclusions.

Mr. G. H. HINDS (*British Transport Commission*) wanted to give details about the rapid progress achieved recently in the field of electronics and gave information on the recent purchases and experience of British Railways.

The PRESIDENT and Mr. DE FONTGALLAND agreed that the replies supplied last year were no longer abreast with the present situation. Nevertheless, these alterations did not warrant any change being made in the summaries of the report.

#### *Summary No. 2 :*

2. Electronic data processing machines are made up of units which, owing to the use of electronics, operate at very high speeds and have high capacity; they are able to carry out any calculation or logical operation (comparison), working from a stored programme.

They are « machines for the automatic processing of information », and their potentialities are far in excess of those offered by standard punch card equipment. In particular, they permit the application of the so-called management by « exception » or

« difference » method to problems comprising a considerable number of data or parameters, so that the machines are well suited to serve as instruments of management and, in particular, as a means of arriving at decisions.

Mr. STRAUSS (*Swiss Federal Railways*) was of the opinion that the wording « machines consisting of units operating at very high speeds and having a very high capacity as a result of the use of « electronics » should be altered to emphasise the possibility that existed of extending the machines by connecting new units.

Mr. DE FONTGALLAND agreed with the remarks made by Mr. STRAUSS and the amendment was approved.

#### *Summary No. 3 :*

3. Electronic data processing machines thus appear to be suitable for dealing with all the problems arising from the management of a railway system, in particular :

- control of staff and of supplies and materials;
- accountancy;
- statistics;
- costing;
- budgetary control;
- user of rolling stock (turn-round);
- studies of fares and charges;
- technical and scientific calculations (time-table calculations, etc.);
- etc.

Mr. STRAUSS suggested a different order of enumeration for the problems which could be solved by EDPM.

- control of staff and supplies;
- accountancy;
- costing;
- budgetary control;

- use of rolling stock (turn round);
- statistics;
- studies of fares and charges;
- technical and scientific calculation (time-table arrangements, etc.).

Mr. DE FONTGALLAND agreed that this order was more logical, statistics being the result of the five preceding functions.

#### *Summary No. 4 :*

4. The use of an electronic data processing machine appears to be subject to the following conditions :

- a minimum level of activity, measured in terms of « basic data ». The advent, on the market, of electronic data processing machines of small capacity will tend to reduce this minimum level;
- the creation of a suitable system of links between the establishments from which the data emanate, the machines by which these data are processed, and the departments interested in the results.

Mr. STRAUSS proposed that the term « small capacity EDPM » be altered to read « EDPM of extensible capacity whose initial equipment is limited ».

Mr. HINDS thought a third condition should be added to the summary which would emphasise the need to supply the basic data in machine language, at a point close to the source of the document, in order to minimise errors and the work of transposition.

Mr. CECCHI (*Italian State Railways*) drew attention to the difference between the two conditions mentioned the second of which did not come into play until the EDPM was actually installed.

Mr. BOSC (*French West African Railways*) proposed that in order to clarify the position, the Summary No. 5 should first be examined in an attempt to define a minimum level of activity which would warrant the installation of an EDPM.

Mr. DE FONTGALLAND remarked that the Summaries Nos. 5 and 6 are interconnected and suggested that these be examined before Summary No. 4.

Summary No. 4 therefore becomes Summary No. 6 while Summaries Nos. 5 and 6 were re-numbered 4 and 5.

— The Meeting then considered the Summaries Nos. 5 and 6.

*Summary No. 5 (New No. 4) :*

5. The applications first dealt with by an electronic data processing machine are, in most cases, those already handled by standard punch card methods. The study of these applications is easier, and economic advantages can be derived from the equipment more rapidly.

Mr. CARLIER (*Belgian National Railways*) thought that the text should be made more explicit, and proposed that it be drafted as follows :

« At the same time the staff becomes progressively more familiar with the EDPM and so allow the Administrations to undertake more complex problems. »

Mr. HINDS agreed with Mr. CARLIER that these notions should be stressed as they emphasised the spirit in which the staff work.

The amendment was adopted.

*Summary No. 6 (New No. 5) :*

6. The most complete utilisation of the potentialities of electronic data processing machines consists in « centralized management » or « integrated data processing », i.e. the centralized processing of all data contained in the various basic documents in which the activity of the system is reflected, with a view to obtaining from them all the results required for management purposes in all spheres. The electronic data processing machine thus represents a « Management Information Centre », at the disposal of the different departments.

It is important to make the point that such a conception is by no means incompatible with the decentralisation of executive functions which is indispensable in a railway system. Introduction must be gradual and calls, in particular, for a very detailed study of all the information circuits of the system, and for a very efficient organisation of the internal links within the Administration.

Mr. STRAUSS referring to the decentralization of executive functions, suggested that for the second paragraph the following text should be adopted :

« The decentralization of management could also be envisaged by using a number of low capacity EDPM interconnected only for the purpose of exchanging processed data.

Mr. SCHMITZ (*Deutsche Bundesbahn*) asked whether the problem of more specialized machines dealing, for example, with seat reservations should not be mentioned in this point in the Summary.

Mr. DE FONTGALLAND remarked that this observation was linked with that already mentioned by Mr. STRAUSS concerning the use of machines for specific purposes.

The amendment proposed by



Mr. STRAUSS was then adopted, while bearing in mind the remarks of Mr. SCHMITZ.

— The Assembly then reconsidered Summary No. 4, which becomes No. 6.

Mr. DE FONTGALLAND, on re-examining the different suggestions made regarding the former Summary No. 4, stated that he did not intend to include in the new Summary No. 6 the suggestion of M. STRAUSS concerning a low capacity EDPM. He pointed out that this term does not lend itself to the idea of extensibility in an EPDM which has been accepted for the new draft of Summary No. 2. However, he mentioned the interest which the possibility would hold for a railway undertaking with regard to the improved machines now on the market, as these are less expensive, and the stage for direct savings is more easily reached.

— The text remained unchanged on this point.

Mr. DE FONTGALLAND then examined the suggestion made by Mr. HINDS who wished to introduce into the text a third condition and also the proposal of Mr. CECCHI who wished to divide clearly the two conditions mentioned.

After some discussion, Mr. DE FONTGALLAND proposed to divide this Summary No. 6 (formerly No. 4) into two distinct Summaries Nos. 6 and 7.

Thus, Summary No. 6 would deal with the minimum level of activity measured in terms of basic data, while the Summary No. 7, incorporating the remarks made by Messrs. HINDS and CECCHI, would deal with the question of liaisons

and with the problem of translating into machine language at a point near to the source of a basic document.

— The Meeting agreed to this proposal.

#### *Summary No. 7 (New No. 8) :*

7. Electronic data processing machines appear to be suitable for the handling of problems common to several Railway Administrations: common tariffs, exchange of materials, wagon pools, etc.

— Adopted without comment.

#### *Summary No. 8 (New No. 9) :*

8. As regards the economic aspects, it appears to be necessary to distinguish between :

- direct savings, compared with present management methods, and
- indirect savings, resulting from improved efficiency of management owing to the supply of more exact and more up-to-date information.

Mr. SANCHEZ (*State Railways, Argentina*) asked that in the French text the meaning of the terms « rentabilité directe » (direct savings) and « rentabilité indirecte » (indirect savings) be defined.

Mr. DE FONTGALLAND explained that direct savings concerned the calculation of costings and the savings schedule for the installation of the new apparatus. There are other advantages which are difficult to evaluate a priori, at least in the early stages of using an EDPM, and which produce the indirect savings.

Messrs. LALONI (*Permanent Commission*) and SANTORO (*Italian State Railways*) proposed also that the text be changed in order to distinguish on the one

hand the financial savings and on the other hand the savings and improvements which eventually could be evaluated.

Mr. THOMANN (*Swiss Federal Railways*) suggested that the direct savings which could be translated into figures be distinguished from complementary savings not so easily calculated.

Mr. DE FONTGALLAND thought that even indirect savings should be evaluated.

Mr. THOMANN withdrew his proposal.

Mr. CARLIER proposed to alter the word «distinguer» (distinguish) by the phrase «tenir compte» (take into consideration).

Mr. HINDS proposed to add a third category of savings: those which are connected with technique of linear programming in the field of operational research.

Mr. DE FONTGALLAND while in agreement thought that this latter constituted an indirect complementary saving; it would suffice to expand the second paragraph by the words «and also the possibilities of solving problems of operational research».

Mr. HINDS agreed with this opinion.

#### *Summary No. 9 (New No. 10):*

9. Of necessity, the preliminary studies preceding the installation of an electronic data processing machine take a long time and are very complex. They call for an efficient organisation and for specially trained

personnel. The best way of dealing with this type of studies appears to be the setting up of «Working Teams», consisting of permanent representatives of all the departments concerned with a particular application.

Mr. LANGEVIN (*Régie Autonome des Transports Parisiens*) mentioned the difficulties encountered concerning the change-over and new training of the basic personnel (working hours needed, and risk of errors which are more difficult to find with machines) for the operating of EDPM for the management of the staff of his Administration.

— The Summary was adopted without change:

#### *Summary No. 10 (New No. 11):*

10. It is suggested that the question should again be put on the agenda of a future Congress at a time when the Administrations will have acquired sufficient practical experience in this field.

Mr. SANCHEZ while not wishing to change the text suggested that a special committee be set up, even temporarily, to study the question of EDPM.

The PRESIDENT and PRINCIPAL SECRETARY remarked that the setting up of a temporary committee was not in accordance with the practice of the International Railway Congress Association.

Mr. ROUSSEAU (*International Railway Union*) said that he was at the disposal of Mr. SANCHEZ and of the Argentinian delegation to advise them concerning the work already done or being carried out by the I.R.U. (U.I.C.)

— The Summary was approved without alteration.

In view of a remark by Mr. UPMARK (*Swedish State Railways*) concerning the expression « extreme novelty » used at the beginning of the first Summary it was agreed that regard would be paid to his remark in the new text which will be submitted during the meeting of October 1.

The PRESIDENT terminated the meeting at 12.30 p.m.

### Meeting held on the 1st October 1958.

— The meeting was opened at 10.30 a.m.

The PRESIDENT called upon the PRINCIPAL SECRETARY to read out the new text of the Summaries taking into account the debates of the meeting of the 30th September, and opened the discussions.

— These Summaries were adopted by the Assembly.

The PRESIDENT extended his special thanks to the two REPORTERS and also to the Delegates who had participated in clarifying the Summaries.

He expressed the hope that the specialists from the various Railways, guided by these conclusions, would, in the future, be able to progress assisted by the support and understanding of all.

— The meeting ended at 11 a.m.

— The complete text of the Summaries adopted is reproduced hereafter :

### SUMMARIES.

« 1. Electronic data processing machines (E. D. P. M.) are recent machines, the scope of which has been realised by the railways. An increasing number of Administrations of varying importance already use E. D. P. M. or are carrying out preliminary studies and are placing orders. However, at the present time the experience so far gained is not sufficient to make it possible to come to final conclusions.

« 2. Electronic data processing machines consist of units which, owing to the use of electronics operate at very high speeds and have a very high capacity; they are able to carry out any calculation or logical operation (comparison) working from a stored programme. The possibility of connecting, in varying number, units carrying out various functions (internal and external stores, input and output organs) give these machines great flexibility and makes it possible to adapt them to a progressive increase in the work.

« They are « machines for the automatic processing of information », and their potentialities are far in excess of those offered by standard punch card equipment. In particular, they permit the application of the so-called « management by « exception » or « difference » method to problems comprising a considerable number of data or parameters, so that the machines are well suited to serve as instruments of management and, in particular, as a means of arriving at decisions.



« 3. Electronic data processing machines thus appear to be suitable for dealing with all the problems arising from the management of a railway system, in particular :

« — control of staff and of supplies and materials;  
« — accountancy;  
« — costing;  
« — budgetary control;  
« — user of rolling stock (turn-round);  
« — statistics;  
« — studies of fares and charges;  
« — technical and scientific calculations (time table calculations, etc.).

« 4. The applications first dealt with by an electronic data processing machine are, in most cases, those already handled by standard punch card methods. The study of these applications is easier, and economic advantages can be derived from the equipment more rapidly. In addition, the staff can gradually become familiar with the possibilities of the E. D. P. M. and is in a position to carry out more efficiently the study of complex problems.

« 5. The most complete utilisation of the potentialities of electronic data processing machines consists in « centralized management » or « integrated data processing », i.e. the centralized processing of all data contained in the various basic documents in which the activity of the system is reflected, with a view to obtaining from them all the results required for management purposes in all spheres. The electronic data processing machine thus represents a « Management Information

« Centre », at the disposal of the different departments.

« Several E. D. P. M. of lower capacity decentralized and adapted to specific functions would be capable of dealing with different problems, having regard to the time within which the various data ought to be processed. In this case, liaisons at managerial level are necessary to exchange and exploit the partially processed results.

« It is important to make the point that such a conception is by no means incompatible with the decentralisation of executive functions which is indispensable in a railway system. Introduction must be gradual and calls, in particular, for a very detailed study of all the information circuits of the system and for a very efficient organisation of the internal links within the Administration.

« 6. The use of an E. D. P. M. appears primarily to require a minimum level of activity measured in terms of basic data. The appearance on the market of E. D. P. M. of low capacity tends to reduce the minimum level.

« 7. Also the achievement of the following conditions facilitate the practical use of an E. D. P. M.;

« — the creation of a suitable system of links between the establishments from which the basic data emanate, the E. D. P. M., processing this data and the departments interested in the results;

« — the translation into machine language of the basic data at a point as close as possible to their source.

« 8. Electronic data processing machines appear to be suitable for the handling of problems common to several Railway Administrations : common tariffs, exchange of materials, wagon pools, etc.

« 9. As regards the economic aspects it is necessary to take into account :

« — direct savings compared with the present management methods;

« — the indirect advantages resulting from improved efficiency of management owing to the supply of more exact and more up to date information and also as a result of the possibility of solving certain problems by operational research.

« 10. Of necessity the preliminary studies preceding the installations of an electronic data processing machine take a long time and are very complex. They call for an efficient organisation and for specially trained personnel. The best way of dealing with this type of studies appears to be the setting up of « Working Teams », consisting of permanent representatives of all the departments concerned with a particular application.

« 11. It is suggested that the question should again be put on the agenda of a future Congress at a time when the Administrations will have acquired sufficient practical experience in this field. »

— The Plenary Meeting ratified these Summaries during its session of the 3rd October 1958.

## QUESTION 8.

**Financing and conserving railway properties and assets.**

**Study and comparison for limited companies, partially state-owned companies and State Railways, of the financial means used for the normal renewal of installations and rolling stock.**

**Forms of amortization and renewal, taking into account for the latter, the slow or speedy depreciation of the currency.**

## Preliminary documents.

Report (America [North and South], Australia [Commonwealth of], Austria, Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by V. FELDER. (See *Bulletin* for May 1958, p. 725.)

Report (Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Viet-Nam and Yugoslavia), by W. KELLER. (See *Bulletin* for March 1958, p. 361.)

Special Report, by W. KELLER. (See *Bulletin* for September 1958, p. 1422.)

## Report of Section IV.

(See *Congress Daily Journal*, No. 4, p. VI and XI; No. 6, p. VI and XII and No. 7, p. XVI.)

**Meeting held on the 2nd October 1958.**

— The meeting opened at 9.30 a.m.

Opening the discussion, the CHAIRMAN emphasised the basic importance of this question for the various railway Administrations: the railways if they are to continue to exist must adapt their equipment and their methods to the rapid progress of modern technique and science; however, the monetary depreciation as well as the financial policy followed by the State in most countries retard to a dangerous extent the modernisation of the rail networks... Such is the problem it is proposed to discuss and to endeavour to resolve.

The CHAIRMAN then invited Mr. W. KELLER, *Special Reporter*, to comment the conclusions of his report.

Mr. W. KELLER having thanked the representatives of the Administrations for the information supplied, recapitulated the essential ideas outlined in the *Special Report*, and emphasised that the two REPORTERS faced with the extreme variety revealed in the methods and presentation of accounts desired above all to arrive at questions of principle and of fundamental working.

Mr. FELDER (*Reporter*), who was then invited to address the Delegates, declared that he had nothing to add to the statements made by Mr. KELLER.

The CHAIRMAN before examining in succession the Summaries of the *Special Report* invited the Delegates to express their opinions of a general nature, with-

out, however, becoming involved in considering the general transport policy.

Mr. LALONI (*Permanent Commission*) wished to point out that the lack of resources from which the Administrations suffered was not exclusively a railway problem, but that it affects many other undertakings under State-supervision. He thought that the traffic receipts should not only cover the amortization and renewal charges, but should also enable provision to be made for the needs of modernisation. He emphasised the need to obtain receipts which would cover all charges and that the railways ought to be indemnified or completely relieved of special charges which are not purely operating costs.

Mr. COTTIER (*Office des Transports Internationaux par Chemins de fer*) congratulated the Permanent Commission on having placed this important problem on the Congress agenda. He thought it desirable to incorporate in the Summaries a comparison of the amortization systems used by the railways not only with those of industry but also with the systems used by the other transport carriers. However, in view of the obligation to carry which is imposed on the railways, these latter must of necessity adapt their amortization not only to a simple renewal of their equipment but also to the modernisation programme required to preserve transport capacity.

Mr. ELEFTÉRIADÈS (*Damas-Hama and extensions Railway*) thought that the diversity of the replies indicated sufficiently that no ideal solution could be found to this problem. He asked that the measures



suggested should be capable of practical application. It appeared to him that in order to achieve this an analysis and definition of the legal obligations regarding amortisation would be required.

Mr. WANSINK (*Netherlands Railways*) remarked that renewal based on the replacement value is not entirely satisfactory for even with this method the property is not conserved nor are the installations maintained and the necessary level of activity, especially when one realises the improvements which are indispensable for the new rolling stock (wagons, locomotives). Industry carries out its modernisation and extension plans by autofinancing. The capital needed greatly exceeds the amount required for simple renewal. If recourse must be made to borrowing, the financial charges become too heavy, especially since the progress in equipment continually reduces the proportion of the labour costs. The situation demands that we should express our opinions in a much clearer fashion, particularly in Summary No. 5. Besides we are not the only ones to hold this opinion; a statement of similar nature made recently before a Commission of the American Senate deserves to be recalled; speaking of air and rail transport, an airlines Delegate requested that as this competition became more intense, the railways should enjoy freedom to improve their competitive position and as a result the service rendered to the public; in this sphere a realistic amortization policy is indispensable.

Mr. HOULEZ (*French National Railways*) thought that in order to choose the best system of amortisation (the conventional

method of making annual theoretical charges for renewals or the method particular to certain networks of charging the actual costs of maintenance and renewal), it was necessary to distinguish the mobile equipment from the fixed assets. It appeared to him that the conventional method in the case of fixed assets (which considerably exceed the mobile equipment) could only lead to very uncertain results. Thus, it would be preferable to apply to them the method of charging the actual costs of renewal.

Mr. CECCHI (*Italian State Railways*) considered that since the tariffs were limited for various reasons, among which is the competition factor, it was necessary to arrive at a formula which would allow the railway to be indemnified while relieving it of the political and social charges imposed on the carrier by rail and also of the abnormal financial charges, especially those which result from the indispensable modernisation of the equipment.

Mr. SJÖBERG (*Swedish State Railways*) was glad that this problem had been examined: it should encourage us to look into the future and to ensure that only that which deserves to be preserved will be retained and this can be achieved by closing, for example, lines where the traffic density is low as a result of the development of road transport.

It is also necessary to divide the capital in a rational fashion and to endeavour to improve the budgeting methods which are still too empirical.

Mr. MEYER (*Swiss Transport Federal Office*) shared the viewpoint of Messrs.

CECCHI and WANSINK. It appeared to him that three conditions required to be fulfilled in order that a policy of expansion would carry the least number of risks :

— that the railway should restrict itself to revenue earning investments;

— that it should endeavour to achieve tariffs covering the costs;

— that the State should indemnify the railways for charges borne in the interest of the community; in Switzerland, a Bill giving effect to this conception has recently become law.

The CHAIRMAN remarked that in a period of inflation, new debts are not as dangerous as during a period of deflation;

Mr. MUKERJEE (*Ministry of Railways, Railway Board, India, and Vice-President*) regretted that his Administration had been unable to forward written replies to the questionnaire, and thought it useful to give some verbal information concerning the situation in India; he drew attention to the difference which exists between the railway systems controlled by the State and private railway undertakings; finally, he emphasised the extreme difficulty of satisfying the need for modernisation.

Mr. VREBOS (*Ministry of Communications, Belgium*) distinguished in the general study of this question of amortisation, three different categories :

— the application of a uniform accountancy;

— the rationalisation of railway accounts;

— the general organisation of transport.

Since the first two points are being

examined elsewhere, only the third point warrants attention; in this respect since the question of amortisation is a problem common to both railways and Governments it would have been of interest to learn the viewpoint of the Governments.

Mr. VREBOS then requested that this remark be published in the Summary and emphasised the close contact which ought to be established between the railways and the Governments to ensure that amortisation will be applied only to that which is really revenue earning, with particular regard when choosing the lines to be amortised.

Mr. MARIN (*Permanent Commission*) expressed his agreement with Mr. MEYER on the remarks dealing with the different categories of amortisation and on the indemnification for charges supported by the railways in the interest of the community or *extraneous to operating*. He wished to draw the attention of the Delegates, however, to the question of tariffs and to the evergrowing necessity to seek, in collaboration with the Government authorities, a policy which would ensure coordination in transport tariffs only possible with a general transport policy.

The PRESIDENT thought that the two essential points to remember were, on one hand, equality in treatment for all transport operators and on the other hand, the need to seek a sound tariff policy bearing in mind the competition factor.

He then invited Mr. KELLER to speak.

Mr. W. KELLER, (*Special Reporter*) declined to cover in his reply all the points

of a general nature raised, and thought it preferable to deal with each one individually when examining each Summary.

The detailed examination of the Summaries then commenced.

#### *Summary No. 1 :*

1. The great majority of the Administrations replied in the negative to the question if the state of their equipments corresponded to the present state of the technique and to the present needs of the traffic. Very great arrears are ascertained in the renewal and modernisation of both fixed installations and rolling stock.

Mr. HOULEZ asked that the final phrase be altered as follows : very great arrears exist if not in the renewals then in the modernisation... ».

Mr. KELLER preferred to retain the original text because these arrears in the renewal of equipment have been stated by the majority of administrations.

Mr. BOSC (*French West Africa Railways*) proposed the following amendment: « there exist in general very great arrears... » (*Amendment adopted.*)

*Summary No. 1 was adopted as follows :*

« The great majority of the Administrations replied in the negative to the question if the state of their equipment corresponded to the present state of the technique, and to the present needs of the traffic. Very great arrears are in general ascertained in the renewal and modernisation of both fixed installations and rolling stock. »

#### *Summary No. 2 :*

2. The arrears in the renewal and modernisation of the equipments are explained partly by war damage and the postwar disturbances. But this is not the principal reason. Proof hereof is that private industry has recovered much more quickly than the railways. The main reason lies in the fact that the railways do not have the needed financial means to auto-finance their renewals as is the case with industry.

Mr. WANSINK proposed to add to the last phrase, after the words « auto-financing of renewals », the words « and of modernisation ».

Mr. ELEFTÉRIADÈS thought that recourse to borrowing, a means legally based on an obligation which one could not avoid, should at least be employed as well as auto-financing; he proposed to exclude from the report this latter term as the idea of auto-financing constituted only a partial solution of the problem, and was bound to fail.

A long debate then ensued on the idea of auto-financing in the course of which remarks were made in succession by the CHAIRMAN, Messrs. FERNANDES (*Benguela Railways*), MORGANTI (*Ministry of Transport, Italy*), HOULEZ, GILLESPIE (*British Transport Commission*), CECCHI, BOSC, COTTIER, WANSINK and KELLER.

The CHAIRMAN asked the REPORTERS to think about this question and to propose at the next sectional meeting a definitive text of Summary No. 2, which will take into account the different opinions voiced by the Delegates.

— The meeting ended at 1.0 p. m.



**Meeting held on the 6th October 1958.**

— The meeting was opened at 9.30 a.m.

Declaring the discussion open, the CHAIRMAN requested the PRINCIPAL SECRETARY to read out the new texts of Summaries 2 and 5 prepared by the reporters and which incorporate the opinions expressed by the delegates during the meeting of 2nd October. Only Summary No. 2 was at the time to be discussed.

The new text hereafter of Summary No. 2, was adopted without remark.

« 2. In certain cases, these arrears can be explained by war damage and the post-war disturbances. The main reason, however, lies in the fact that the traffic receipts of the railways are insufficient to finance by their own means the renewal and modernisation of their equipment, as industry generally has been or is able to do (auto-financing). »

*Summary No. 3 :*

3. Auto-financing can possibly be done only when the prices cover at least the expenses, these including adequate amortisations, that is to say amortisations calculated on the economic and not the technical life and on the replacement value.

Now, this condition is not fulfilled with most railways. The amortisations are inadequate, and even these insufficient amortisations are not covered by the receipts. If the amortisations are insufficient, it is not because the Administrations ignore the harmful consequences which will result. Usually a pressure is exerted by the political authorities on the level of amortisation or renewal charges with a view to reduce the deficits to be met by the State. This pressure explains why the deficits are incompletely covered by the State who so cannot replace sufficient receipts. What the State gives to the railways so far as it meets the deficits is as a rule too much for dying and too little for living.

Before discussing Summary No. 3, the CHAIRMAN pointed out that on the suggestion of Mr. COTTIER, this Summary has been expanded by a third paragraph conceived so as to emphasise the notion that amortisation is all the more necessary in virtue of the fact that the State imposes the obligation to operate.

This amendment while defended, by Mr. COTTIER gave rise to a reservation by Mr. ELEFTÉRIADÈS and to a request for an explanation by Mr. MUKERJEE (*Vice-Chairman*). After an explanation by the *Special Reporter*, Mr. KELLER, the addition of this supplementary paragraph was put to the vote and was finally adopted.

— Summary No. 3 was adopted worded as follows :

« 3. Auto-financing is possible only provided that the tariffs cover at least the expenses, including amortisations, that is to say amortisations calculated on the economic and not the technical life and on the replacement value.

« This condition is not however fulfilled with most railways. The amortisations are inadequate and even these insufficient amortisations are not covered by the receipts. If the amortisations are insufficient, it is not because the Administrations ignore the harmful consequences which will result. Usually pressure is exerted by the public authorities on the level of amortisation or renewal charges with a view to reducing the deficits to be met by the State. This pressure explains why the deficits are incompletely covered by the State and thus cannot replace insufficient receipts. What the State gives to the railways so far as it meets the deficits is as a rule too much to allow

them to die and too little to enable them to live.

« The reduction effected in the amortisation of railways is therefore all the more difficult to justify since they have legal obligations to operate and carry which were imposed on them by the States; instead of a reduction these obligations would rather justify a strengthening of industrial amortisation in order to assure the continuity of rail transportation, at least for those lines which should be preserved and for which other modes of transport should not be substituted. »

#### *Summary No. 4 :*

4. The delay in renewal and modernisation of the investments weakens the position of the railways facing their competitors: for example the railway carriages 40 to 50 years old cannot compete with the modern cars or aeroplanes. Furthermore, it is an obstacle to introduce modern technical methods for increasing productivity and improving the service. The result is a growing deficit which from its side causes a growing pressure on the amortisations.

Mr. BOSC proposed two slight modifications in the French text :

— instead of « it is an obstacle to the introduction of modern technical methods for increasing productivity... », the following more precise text should be adopted : « it is an obstacle to acquiring the equipment of modern technique, the use of which would permit an increase in productivity... ». He also proposed the substitution of the verb « entraine » to the verb « appelle » in the final sentence of the French text. Mr. COTTIER discussed the suitability of the term « affaiblit » (weakens) in the first sentence, which is only borne out in the long term.

Mr. VREBOS associated himself with this remark and likewise Mr. MORGANTI, who proposed to replace the term « affaiblit » by « aggrave la position » (worsens the position).

Mr. WANSINK suggested that the human factor should be included in this Summary and also the disaffection of the technical elite with regard to rail transport.

An exchange of views in which Messrs. BOSC, LALONI and MUKERJEE took part brought forth every shade of opinion and resulted in a more precise wording.

Mr. HOULEZ in order to secure agreement between Messrs. COTTIER and BOSC proposed that in the first phrase a distinction be made between : « the technical position » (a remark of Mr. COTTIER) and the words « et financière » (remark of Mr. BOSC).

Mr. COTTIER wished that in the final phrase the words in the French text « entraine une pression croissante » be attenuated since this statement was not valid in all cases, especially in Switzerland.

After discussion, Mr. COTTIER suggested that the expression « entraine souvent » be adopted.

Mr. WANSINK re-emphasised the notion of the human and psychological factor which he wished to introduce into this Summary by deleting if necessary the example mentioned in the original version which renders the wording less clear.

After interventions by Messrs. ROUSSEAU (*International Railway Union*) and FELDER, the new text of Summary No. 4 was read out and finally adopted.

« 4. The delay in the renewal and modernisation of the investments renders the technical and financial position of the railways graver still in face of competition.

« On the one hand, this position makes it an obstacle to acquire the means of modern technique whose use would allow the railways to increase their productivity and improve their services.

« On the other hand, it reduces the attraction of railway careers for the best among the young people.

« The result is a growing deficit which in turn, causes an increasing pressure on the amortisations. »

#### *Summary No. 5 :*

5. To get out of this vicious circle, the railways ought at least to be able to procure the funds needed for renewing their equipments by auto-financing. This is only possible with adequate amortisations and especially by « earned » amortisations, that is covered by the receipts. To obtain this financial equilibrium, two actions shown to be essential amongst others :

- (1) The railways must be relieved of or indemnified for the costs resulting from the services imposed by the State that favour the economy of the country as a whole; they must also be relieved of charges which are outside the operating needs.
- (2) A reasonable co-ordination must be carried out between the various transport carriers in order to place the railway on equal terms with competing means of transport.

*The question of the conservation of the investments and capital of the railways is therefore fundamentally one of the general transport policy.*

The PRINCIPAL SECRETARY read out Summary No. 5, the text of which had been altered to incorporate the remarks

made during the previous meeting concerning the idea of auto-financing.

This text incorporates principally the following wording proposed by Mr. COTIER : « To obtain a better financial equilibrium the following measures are essential :

1) a still more perfect coordination must be carried out between the various means of transportation so as to make equal or closer the competitive conditions between them;

2) in so far as the inequalities in competition are due to indispensable public service charges which cannot be renounced or reduced, an equitable financial compensation by the State is essential.

3) it goes without saying that charges which are outside rail operation needs, and are imposed by the State, should be met by the State. »

Mr. BOSC referred to certain specific instances (the example of the Cameroons), and insisted on replacing in the new text the expression « a still more perfect coordination » by the terms « more effective coordination ».

Mr. HOULEZ wished to see introduced in this Summary the notion of revenue-earning (rentabilité) so as to clearly distinguish the field which can be covered by a loan, because it is revenue-earning, from that which should not be covered by a loan because it is not revenue-earning.

Mr. ELEFTÉRIADÈS supported this remark and the opinion of Mr. HOULEZ which had been expressed earlier. In his view,



all industrial amortisation which would be added to amortisation of loans (financial amortisation) would lead to an inexact presentation of the balance sheets. Besides, the renewal funds constituted by industrial amortisation, should deal only with renewals and not with extension of installations, and improvement and modernisation should be ensured by a reserve fund. However, obligatory recourse to loans, both for renewals and modernisation, appeared to him to be the most practical method to renovate the railways.

The CHAIRMAN recognised that railways are victims of inflation, but he thought that the method outlined by the speaker dealt too exclusively with an abnormal period of grave inflation, while we should consider as normal a healthy situation.

Mr. BOSC pointed out the two major drawbacks to this « easy way out solution » which consists in having recourse to loans : the impossibility on one hand of meeting the growing demands of the staff; the difficulty of the railway's position faced by their competitors.

Mr. ELEFTÉRIADÈS admitted these objections but he had merely wished to supply a realistic answer to a critical situation.

Mr. WANSINK wished to make clear the idea of sufficient and « earned » amortisations : he would also like to add a third point which would underline the need for Governments to authorise the railways to better adapt their tariffs to covering their costs.

A discussion ensued on this proposal between Messrs. LALONI, MORGANTI and COTTIER. Mr. WANSINK, supported by the CHAIRMAN, finally proposed that reference be made to this freedom in tariff making as far as it is commercially possible in a new paragraph of the Summary.

The Assembly agreed to this addition and also on a new arrangement of the Summary's wording concerning the « measures to be taken ».

Mr. MEYER wished to delete in the French text the adverb « encore » in the expression « coordination encore plus efficace ». He then requested clarification of the amendment proposed by Mr. COTTIER and wished to return to the original drafting.

Point 2 of Mr. COTTIER's amendment was put to the vote and finally rejected in favour of the former point 1 of the original text which was retained.

The PRINCIPAL SECRETARY read out the new Summary No. 5 concerning which Mr. COTTIER expressed new reserves.

The CHAIRMAN pointed out that it was really a matter of defining two extreme limits, between which practical solutions should be found.

Mr. CECCHI thought that the expression « earned » amortisation was not precise and suggested to substitute instead the words « amortisations which are really covered by the receipts ». Mr. WANSINK expressed the same opinion.

— The text finally adopted was worded as follows :

« 5. To escape from this vicious circle,

the railways ought at least to be able to secure the funds needed for renewing and modernising their equipment by auto-financing. Recourse to loans can be justified where there is an increase in transport capacity or where productivity will be increased; the resultant financial charges should always be capable of being borne to a large extent. Auto-financing is only possible with adequate amortisations which are really covered by the receipts. To obtain a better financial equilibrium the following measures are essential :

« 1) A more efficient coordination must be carried out between the various means of transport in order to attain or to approach more closely conditions of competitive equality between them;

« 2) Railway tariff obligations must be made as flexible as possible wherever this practice is commercially possible;

« 3) The railway must be relieved of or indemnified for the costs resulting from the services imposed by the State and which favour the economy of the country as a whole; it must also be relieved of charges which are distinct from the operating needs. »

#### *Summary No. 6 :*

6. As regards the accountancy technique of the amortisations and the presentation of the accounts, two things appear advisable: on the one hand, that the Railway Administrations or the Political Authorities, in the event of a deficit, give up the practice of reducing the amortisations below the level materially justifiable and so give a seemingly better appearance to the results; this reduction only serves to hide the real situation of the undertaking and to delay the needed measures of rehabilitation. On the other hand, that the Railway Administrations

should follow more closely the commercial practice when calculating and presenting the amortisation accounts. Even if the special methods of the railways were identical materially with the classical system of amortisation, which is only partly true, the adoption of this system would have the advantage of making the railway accounts clear and more understandable by business and political men not specialised in railway accountancy. Accounts difficult to understand give rise to suspicion. Now, the railways need the understanding and the confidence of economic and political circles if they are to make good their claims which can be summed up as follows: to demand prices which cover the costs that is to say which make it possible to conserve the substance and the capital.

Mr. BOSC suggested a modification in the French text.

Mr. HOULEZ proposed the following amendment : (after the sentence « On the other hand, that the railway Administrations..., the presentation of the amortisation of accounts ».) « However, for the fixed installations, it is recommended that renewal costs be charged directly to operating expenses ».

Mr. KELLER rejected this amendment which did not correspond to the general experience and would lead to a reduction of amortisations.

Messrs. CECCHI and THOMANN (*Swiss Federal Railways*) shared the opinion of the REPORTER.

— The amendment was put to the vote and finally rejected.

Mr. ELEFTÉRIADÈS suggested that in the final phrase the second term of the expression « the substance and capital » be

deleted, since the capital was invested in the substance.

Mr. KELLER did not accept this amendment for it is necessary to consider the theoretical case during a period of falling prices.

The CHAIRMAN thought that this theoretical risk should not be retained and the amendment was finally accepted. Nevertheless, on the suggestion of Mr. CECCHI it was decided to simplify the final phrase.

Mr. SCHOONJANS read out the definitive Summary No. 6.

« 6. As regards the accountancy technique of the amortisations and the presentation of the accounts, two things appear desirable : on the one hand, that the Railway Administrations or the public authorities in the event of a deficit renounce the practice of reducing the amortisations below the level materially justifiable and so giving a seemingly better appearance to the results; this reduction only serves to hide the real situation of the undertaking and to delay the needed measures of rehabilitation; on the other hand, the Railway Administrations should follow more closely commercial practice when calculating and presenting the amortisation accounts. Even if the special methods of the railways were identical materially with the conventional method of amortisation, which is only partly true, the adoption of this system would have the advantage of making the railway accounts clearer and more intelligible to business and political men not specialised in railway accountancy. Accounts which are difficult to understand give rise to suspicion. Now, the railways need the

understanding and confidence of economic and political circles if they are to make good their claims which are set out in the Summaries. »

Mr. COTTIER wished to warn the Section against the adoption of summaries which incorporate certain contradictions.

The CHAIRMAN felt that there did, in fact, exist a contradiction between the third paragraph of Summary No. 3, which was proposed by Mr. COTTIER and the new Summary No. 5, which did not distinguish between the services imposed by State that favoured the economy of the country as a whole and those which are outside the operating needs.

A discussion, in which Messrs. COTTIER, MARIN, LALONI, MEYER and the CHAIRMAN took part, finally resulted in this text being retained as this latter did not exclude intermediate or partial solutions suggested by Mr. COTTIER.

The CHAIRMAN thanked the two REPORTERS and also all the speakers and staff who had collaborated in clarifying these difficult summaries.

Mr. LALONI wished to express on behalf of the Meeting his thanks to the CHAIRMAN who had conducted the discussions in a firm and objective manner.

— The meeting ended at 12.30 p. m.

— The complete text of the Summaries adopted is as follows :

### SUMMARIES.

« 1. The great majority of the Administrations replied in the negative to the question if the state of their equip-



« ment corresponded to the present state  
« of the technique, and to the present  
« needs of the traffic. Very great ar-  
« rears are in general ascertained in the  
« renewal and modernisation of both  
« fixed installations and rolling stock.

« 2. In certain cases these arrears can  
« be explained by war damage and the  
« post-war disturbances. The main  
« reason, however, lies in the fact that  
« the traffic receipts of the railways are  
« insufficient to finance by their own  
« means the renewal and modernisation  
« of their equipment, as industry ge-  
« nerally has been or is able to do  
« (auto-financing).

« 3. Auto-financing is possible only  
« provided that the tariffs cover at  
« least the expenses, including amortisa-  
« tions, that is to say amortisations cal-  
« culated on the economic and not the  
« technical life and on the replacement  
« value.

« This condition is not however ful-  
« filled with most railways. The amor-  
« tisations are inadequate and even these  
« insufficient amortisations are not cov-  
« ered by the receipts. If the amortisa-  
« tions are insufficient, it is not because  
« the Administrations ignore the harm-  
« ful consequences which will result.  
« Usually pressure is exerted by the  
« public authorities on the level of  
« amortisation or renewal charges with  
« a view to reducing the deficits to be  
« met by the State. This pressure  
« explains why the deficits are incom-  
« pletely covered by the State and thus  
« cannot replace insufficient receipts.  
« What the State gives to the railways

« so far as it meets the deficits is as a  
« rule too much to die and too little  
« to enable them to live.

« The reduction effected in the amor-  
« tisation of railways is therefore all the  
« more difficult to justify since they  
« have legal obligations to operate and  
« carry which were imposed on them by  
« the States; instead of a reduction,  
« these obligations would rather justify  
« a strengthening of industrial amorti-  
« sation in order to assure the continuity  
« of rail transportation, at least for  
« those lines which should be preserved  
« and for which other modes of trans-  
« port should not be substituted.

« 4. The delay in the renewal and  
« modernisation of the investments  
« renders the technical and financial  
« position of the railways graver still  
« in face of competition.

« On the one hand, this position makes  
« it an obstacle to acquire the means of  
« modern technique whose use would  
« allow the railways to increase their  
« productivity and improve their ser-  
« vices.

« On the other hand, it reduces the  
« attraction of railway careers for the  
« best among the young people.

« The result is a growing deficit  
« which, in turn, causes an increasing  
« pressure on the amortisations.

« 5. To escape from this vicious  
« circle, the railways ought at least to  
« be able to secure the funds needed  
« for renewing and modernising their  
« equipment by auto-financing. Re-  
« course to loans can be justified where  
« there is an increase in transport capa-

« city or where productivity will be in-  
« creased; the resultant financial charges  
« should always be capable of being  
« borne to a large extent. Auto-financ-  
« ing is only possible with adequate  
« amortisations which are really covered  
« by the receipts. To obtain a better  
« financial equilibrium the following  
« measures are essential :

« 1) A more efficient coordination  
« must be carried out between the va-  
« rious means of transport in order to  
« attain or to approach more closely  
« conditions of competitive equality  
« between them;

« 2) Railway tariff obligations must  
« be made as flexible as possible wher-  
« ever this practice is commercially pos-  
« sible;

« 3) The railway must be relieved of  
« or indemnified for the costs resulting  
« from the services imposed by the State  
« and which favour the economy of the  
« country as a whole; it must also be  
« relieved of charges which are distinct  
« from the operating needs.

« 6. As regards the accountancy  
« technique of the amortisations and the  
« presentation of the accounts, two  
« things appear desirable : on the one  
« hand, that the Railway Administra-

« tions or the public authorities in the  
« event of a deficit renounce the prac-  
« tice of reducing the amortisations  
« below the level materially justifiable  
« and so giving a seemingly better ap-  
« pearance to the results; this reduction  
« only serves to hide the real situation  
« of the undertaking and to delay the  
« needed measures of rehabilitation; on  
« the other hand, the Railway Admin-  
« strations should follow more closely  
« commercial practice when calculating  
« and presenting the amortisation ac-  
« counts. Even if the special methods  
« of the railways were identical mate-  
« rially with the conventional method of  
« amortisation, which is only partly  
« true, the adoption of this system would  
« have the advantage of making the rail-  
« way accounts clearer and more intel-  
« ligible to business and political men  
« not specialised in railway accountancy.  
« Accounts which are difficult to under-  
« stand give rise to suspicion. Now, the  
« railways need the understanding and  
« confidence of economic and political  
« circles if they are to make good their  
« claims which are set out in these sum-  
« maries. »

— The Plenary Meeting ratified these  
Summaries during its session of the  
7th October 1958.

## SECTION V. — Light railways and colonial railways.

*President* : Mr. V. PERRONE.

*Vice-Presidents* : Messrs. R. HOENS, T.C. COURTNEY, D.H.C. DU PLESSIS and J. ŠVAGEL.

*Principal Secretary* : Mr. R. DE CLERCQ.

### QUESTION 9.

**Experience obtained concerning the undulatory wear of rails.**

- **Damaging effects on the track, bridges, viaducts and tunnels, and on the rolling stock.**
- **Research into the causes of this kind of wear.**
- **Measures taken to avoid or to remedy it.**

#### Preliminary documents.

Report (America [North and South], Australia [Commonwealth of], Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden and the United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by N. C. VOGAN. (See *Bulletin* for May 1958, p. 747.)

Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Union of Soviet Socialist Republics, Viet-Nam and Yugoslavia), by LUIS PRIETO DELGADO. (See *Bulletin* for June 1958, p. 963.)

Addendum to Report, by L. PRIETO DELGADO. (See *Bulletin* for August 1958, p. 1303.)

Special Report, by L. PRIETO DELGADO. (See *Bulletin* for September 1958, p. 1430.)

### Report of Section V.

(See the *Congress Daily Journal*, No. 2, p. XI; No. 3, p. X and XIII; No. 5, p. I and No. 7, p. XVII.)

#### Meeting of the 30th September 1958.

The meeting opened at 10.00 a.m.

The PRESIDENT welcomed the Delegates present and thanked them in advance for their interest in the debates.

Question 9 being the first item on the agenda, the PRESIDENT asked Mr. PRIETO (*Special Reporter*) to read the Summaries of his report.

The PRESIDENT then asked if any delegates had questions of a general nature to raise.

— No general remarks were made.

Detailed discussion of each summary was commenced, starting with Chapter I : *Types and characteristics of undulatory wear of rails.*

#### Summary No. 1 :

1. The different types of undulatory wear can be classified into two groups :

- a) short wave undulatory wear, the length of wave being 0.03 to 0.08 m (1.181 to 3.149 in.) (most frequently 0.043 m = 1.692 in.), and the depth 0.12 mm (0.00472 in.) (maximum of 0.4 mm = 0.01574 in.);



b) long wave undulatory wear, with which the length of wave varies between 0.10 and 2 m (3.937 in. and 6 ft. 6 3/4 in.), the depth being 5 mm (0.196 in.) and over.

Mr. KUMAR (*Indian Government Railways*) suggested that the lower limit of 0.03 m for short wave undulatory wear was too great, and he proposed 0.02 m. (*This modification was adopted*).

In addition, Mr. KUMAR proposed retaining only one decimal place in the figures of the English text.

At the request of Mr. FEYRABEND (*French National Railways*), Mr. PRIETO explained that the wave length of 0.43 m quoted as the most frequent one, was based on information given by a number of Administrations and was not a calculated average.

Consequently, Summary No. 1 was adopted in the following form :

« 1. The different types of undulatory wear can be classified into two groups :

« (a) short wave undulatory wear, the length of wave being 0.02 to 0.08 m (0.8 to 3.1 in.) (most frequently 0.043 m = 1.7 in.) and the depth 0.12 mm (0.005 in.) (maximum of 0.4 mm = 0.02 in.).

« (b) long wave undulatory wear, with which the length of wave varies between 0.10 and 2 m (3.9 in. and 6 ft. 7 in.), the depth being 5 mm (0.2 in.) and over. »

#### *Summary No. 2 :*

2. The commencement and development of undulatory wear are extremely complex phenomena which it is very difficult to explain completely.

The factors which can have an influence upon undulatory wear are essentially :

a) the material and method of fabrication of the rails;

- b) rail-wheel pressure;
- c) vibrations of the rail;
- d) reactions of the rail-wheel system under the influence of the rolling stock;
- e) oxydation due to friction;
- f) the rolling stock;
- g) the profile of the lines;
- h) the kind of traffic;
- i) method of laying.

Mr. KUMAR made the following observations :

1. The two items (b) and (d) appeared identical. He proposed the deletion of one of them.

2. Item (i) should be deleted, taking into account the statement made in Summary No. 20 that « the method of laying has very little effect upon undulatory wear. »

3. He requested the deletion of the word « commencement » at the beginning of the text; the word « development » implying this state.

4. He believed that an important factor — that of the rigidity of the bed — had been omitted.

After discussion, to which contributions were made by Messrs. FEYRABEND, OQUIÑENA (*Spanish Ministry of Public Works*), HOENS, DE CLERCQ, IVANOV (*U.S.S.R. Railway Transport Ministry*) and EYDES (*East African Railways and Harbours*), Summary No 2 was adopted in the following amended form :

« 2. The commencement and development of undulatory wear are extremely complex phenomena which it is very difficult to explain completely.

« The factors which can have an

influence upon undulatory wear are essentially :

« (a) the material and method of fabrication of the rails;

« (b) vibrations of the rail;

« (c) rail-wheel pressure and reactions of the rail-wheel system under the influence of the rolling stock;

« (d) oxidation due to friction;

« (e) the rolling stock;

« (f) the profile of the lines;

« (g) the kind of traffic;

« (h) the method of laying;

« (i) the rigidity of the bed. »

#### *Summary No. 3 :*

3. The damage caused by undulatory wear is far from negligible and is worth taking into consideration.

Most of the railways have found that on lines showing serious undulatory wear there is rapid general deterioration of the track, loosening of the rail fastenings, coachscrews and bolts, ovalisation of the coachscrew holes, loosening of the anti-creep devices, disturbance of the bed, sleepers and ballast.

It can definitely be stated that more rapid deterioration of the sleepers has been noted in sections with serious undulatory wear.

— Adopted without modification.

#### *Summary No. 4 :*

4. Again rapid loosening of the assembly of metal bridges has been noted.

At the request of Mr. KUMAR, Mr. PRIETO stated that no information had reached him concerning deterioration of the assembly of welded metal bridges.

Mr. FEYRABEND proposed the deletion of the word « rapid ».

After an exchange of views between Messrs. KUMAR, FEYRABEND and PRIETO, the following amended text was adopted :

« 4. Again, loosening of bolts and rivets in metal bridges has been observed. »

#### *Summary No. 5 :*

5. Research work concerning its effects upon the rolling stock is somewhat inconclusive.

In general, the vibrations set up by undulatory wear have a destructive effect upon the various parts of the rolling stock. But it is extremely difficult to evaluate the total sum of such damage, especially in the case of the rolling stock.

Following an intervention by Mr. KUMAR who remarked that research into the effect on rolling stock was still being undertaken, it was proposed to delete the first paragraph of the Summary.

After an exchange of views between Messrs. KUMAR and FEYRABEND, the following text was finally adopted :

« 5. In general, the vibrations set up by undulatory wear have a destructive effect upon the various parts of the rolling stock, but it is difficult to evaluate the extent of the damage caused. »

The Section then considered Chapter II : *Investigation into the causes of undulatory wear.*

#### *Summary No. 6 :*

6. The composition of the metal plays an important part in the formation of undulatory wear. For example, Martin-Siemens rails with a low nitrogen content are generally less subject to short wave undulatory wear than Thomas steel rails, and heat treated rails are more exposed to it than those which have not been so treated.

Mr. KUMAR asked for the word «exposed» to be replaced by «vulnerable». This amendment was adopted.

Mr. FEYRABEND observed that low nitrogen content is not necessarily associated with the composition of either Martin-Siemens or Thomas steel, and as a result of these two observations, the following text was adopted :

« 6. The composition of the metal plays an important part in the formation of undulatory wear. For example, Martin-Siemens rails are generally less subject to short wave undulatory wear than Thomas steel rails. However, a low nitrogen content improves the resistance to wear of rails manufactured by these two processes. Heat treated rails are more vulnerable to it than those which have not been so treated. »

*Summary No. 7 :*

7. Rails that have been treated and those that have been straightened upright tend to show more marked undulatory wear.

As a result of an intervention by Messrs. KUMAR and PRIETO, the Delegates agreed to adopt the following version :

« 7. Rails which have been straightened upright during manufacture tend to show more marked undulatory wear. »

*Summary No. 8 :*

8. Although short wave undulatory wear affects rails of all weights (perhaps heavy rails slightly more), long wave undulatory wear occurs the lower the weight, moment of inertia and limit of elasticity.

An amendment to the English text was adopted at Mr. KUMAR's request.

Mr. R. LÉVI (*French National Railways*) stated that in his opinion the weight of rails has no effect on long wave undulatory wear. He was afraid that in their replies certain Administrations had confused real undulatory wear (undulatory deformation of the running surface) with undulatory deformation of the whole rail.

The SPECIAL REPORTER and the Delegates agreed to adopt the following text :

« 8. Undulatory wear affects rails of all weights. Short wave undulatory wear may perhaps be more apparent with heavy rails. »

*Summary No. 9 :*

9. In general, welded track shows no difference from the point of view of undulatory wear compared with ordinary non-welded track.

Mr. FEYRABEND stated that according to his experience in France, long welded rails appear to give a slightly lower incidence of undulatory wear compared with non-welded rails.

After an exchange of views, to which Messrs. FEYRABEND, KUMAR and IVANOV contributed, the following text was adopted :

« 9. In general, welded track shows no appreciable differences from the point of view of undulatory wear compared with ordinary non-welded track. »

The meeting was adjourned at 12.15 p.m. It will continue on Wednesday, 1st October, with the examination of the other Summaries of Question 9.



### Meeting of the 1st October 1958.

— The meeting opened at 9.30 a.m.

The examination of the Summaries of Question 9 was continued.

#### *Summary No. 10 :*

10. Certain observations make it possible to state that the use of check-rails results in a certain reduction in the depth of long wave undulatory wear, especially if there are no joints.

On the other hand, it appears that short wave undulatory wear disappears in line with level crossings equipped with check-rails.

Mr. JACKSON (*South African Railways and Harbours*) asked whether the joints referred to in the Summary were in the check-rails.

Mr. PRIETO confirmed that this was so.

After an exchange of views in which Messrs. KUMAR and FEYRABEND participated, mentioning that check-rails normally have no joints, the text was amended as follows :

« 10. Certain observations make it possible to state that the use of check-rails results in a certain reduction in the depth of long wave undulatory wear.

« On the other hand, it appears that short wave undulatory wear disappears in line with level crossings equipped with check-rails. »

#### *Summary No. 11 :*

11. The joints are a disturbing influence, but the data collected being contradictory, it is difficult to state whether they affect the formation or the development of the waves, or both together.

Mr. FEYRABEND remarked that welded joints appeared to be a disturbing influence generating undulatory wear, although to a lesser degree than fishplated joints.

After interventions by Messrs. KUMAR and UPMARK (*Swedish State Railways*), who were in agreement with this point of view, the text was suitably amended, as indicated hereafter :

« 11. The rail joints whether fishplated or welded are disturbing influences, though to a different degree, but the data collected being contradictory, it is difficult to state whether they affect the formation or the development of the waves, or both. »

#### *Summary No. 12 :*

12. No conclusive information has been supplied concerning the influence of the sleepers. No precise law can be formulated concerning the influence of the material used for the sleepers and the type of fastening. However, it has not been proved that the kind and method of laying the sleepers has no effect on the formation and development of the waves.

— The text was adopted, subject to a slight amendment suggested by Mr. KUMAR to the English version.

#### *Summary No. 13 :*

13. It appears from an examination of the replies that a well laid layer of ballast is indicated to reduce undulatory wear. Some very large Administrations have found that there is an unfavourable influence on lines laid on an insufficiently elastic bed, especially as regards long wave undulatory wear.

Mr. UPMARK proposed the deletion of the words « very large » in the phrase : « Some very large Administrations have found... »

Mr. FEYRABEND observed that he agreed concerning the influence upon the elasticity of the bed. He requested, in addition, that the idea of a non-elastic bed be illustrated by the remark « (particularly on rocky foundations). »

After an exchange of views between Messrs. UPMARK, KUMAR, FEYRABEND and PRIETO, these various amendments were adopted.

— The Summary was worded as follows :

« 13. It appears from an examination of the replies that a well laid layer of ballast is indicated to reduce undulatory wear. Some Administrations have found that there is an unfavourable influence on lines laid on an insufficiently elastic bed (particularly on rocky foundations). »

*Summary No. 14 :*

14. The following factors favour the formation of undulatory wear: the non-suspended weight in the case of electric traction, small diameter wheels and uniformity of such diameters, braking by means of cast iron shoes, conical tyres, small spacing between driving axles.

Mr. KUMAR proposed to replace the phrase : « the non-suspended weight in the case of electric traction », by « the non-suspended weight of traction motors ».

Mr. REDER (*Secretary*) mentioned that there existed in fact the same type of motor in diesel traction.

— The Summary was worded as hereafter, to take into account these remarks :

« 14. The following factors favour the formation of undulatory wear : the unsprung weight of traction motors, small diameter wheels and uniformity of such diameters, braking by means of cast iron shoes, conicity of tyres, small spacing between driving axles. »

*Summary No. 15 :*

15. The influence of the profile of the lines cannot be determined, the statements

made being too contradictory. This also applies to the influence of the locality: humidity, tunnels, corrosion.

Mr. FEYRABEND mentioned that in the S.N.C.F. no undulatory wear has ever been observed in tunnels, apparently due to the rapidity of corrosion which does not allow the time for undulatory wear to appear.

Mr. PRIETO indicated however that certain Administrations have stated that undulatory wear existed in tunnels.

After an exchange of views between Messrs. FEYRABEND, PRIETO and KUMAR, the text of Summary No. 15 was amended, and an additional phrase included referring to the interest that research in this field would provide.

— Summary No. 15 was worded as follows :

« 15. The influence of the profile of the lines cannot be determined, the statements made being too contradictory. This also applies to the influence of the locality. It would, however, be interesting to pursue research particularly into the effect of tunnels and sections subject to considerable corrosion. »

The Assembly then considered Chapter III : *Steps taken to avoid undulatory wear or to remedy it.*

*Summary No. 16 :*

16. None of the existing types of fastenings can completely prevent undulatory wear which is to a large extent a function of the nature of the metal. It still remains to ascertain whether the evolution of the phenomenon can be influenced, since the introduction of elastic components into the fastenings is relatively recent.

Mr. KUMAR proposed to delete the phrase referring to the relationship between undulatory wear and the nature of the metal, this point having already been commented upon previously.

Following interventions by Messrs. FEYRABEND and UPMARK, the Summary was adopted in a slightly modified form, as given hereafter :

« 16. No type of existing conventional fastening has yet been proved to prevent undulatory wear. The introduction of fastenings with elastic features is of too recent origin to permit of a conclusion being drawn with regard to their effect. »

*Summary No. 17 :*

17. Increasing the number of sleepers appears to have a beneficial effect on long wave undulatory wear; this is not so, however, in the case of short waves, according to the observations of nearly all the Administrations.

Mr. FEYRABEND was afraid that certain Administrations had confused real undulatory wear with the undulatory deformation of the whole rail, when replying to the effect that increasing the number of sleepers might have on long wave undulatory wear. In his opinion, increasing the number of sleepers has no effect on undulatory wear, whether short or long.

Mr. JACKSON agreed with this opinion, quoting experiments made by the South African Railways on curves of short radius.

After comments by Mr. KUMAR, the text was suitably amended, and Summary No. 17 was worded as indicated below :

« 17. Increasing the number of sleepers

does not appear to have a beneficial effect on undulatory wear. »

*Summary No. 18 :*

18. The practice of grinding the rails must undoubtedly attract the attention of the Administrations, both grinding during maintenance and that practised before putting new rails into service. It should be pointed out, however, that the value of grinding before putting rails into service has not yet been proved.

Mr. FEYRABEND asked whether any Administrations grind new rails before laying. He thought that this practice would be quite extraordinary and that perhaps grinding rails removed to workshops before relaying was what was meant.

Mr. PRIETO said that such a procedure had been reported by the German Railways, but no delegate of this Administration was present at the meeting to reply to Mr. FEYRABEND's question.

Mr. KUMAR proposed that the fact that grinding as an item of maintenance is carried out by many Administrations should be noted.

The text was amended to take account of these remarks, and worded as follows :

« 18. The practice of grinding rails as an item of maintenance has been adopted by many Administrations. »

*Summary No. 19 :*

19. Heat treatment before laying, by annealing, and after laying, by blowlamp, is very costly. The result of such operations is uncertain.



Mr. FEYRABEND stated that according to the experience of the French Railways, although heat treatment of the running surface appears to improve the resistance of rails to undulatory wear at first, it is detrimental in the long run. Later on, in fact, scaling of the running surface is produced.

After an exchange of views between Messrs. KUMAR, UPMARK and LUPPI (*State Railways, Argentina*), the text of the Summary was amended as follows, to take account of this comment :

« 19. Heat treatment before laying, by annealing, and either before laying or after laying by blowlamp, is very costly. Whereas the result of heat treatment by annealing appears to have uncertain effects, heat treatment by blowlamp appears to be detrimental in the long run. »

The Section considered next Chapter IV: *Systematic research.*

#### *Summary No. 20 :*

20. The trials and researches put in hand on small sections by certain Administrations are of very recent date, and it is too soon to formulate any final conclusions. However, the following results may be mentioned :

The chemical composition, heat treatment and method of fabrication have a well determined influence upon the various types of undulatory wear.

Certain rails, especially those made of Thomas steel, show pronounced undulatory wear, whilst rails made of Martin-Siemens steel with a low nitrogen content, remain exempt or are only slightly affected.

The effect of increased stressing of the rails by the rollers produces the original undulations.

The behaviour of rails made of Thomas steel, elaborated with an oxygen rich blast, is similar to that of Martin-Siemens rails.

The behaviour of annealed rails is also favourable.

In places where undulatory wear exists, it has been possible to determine that the vehicles do not vibrate at the same frequency as that of the undulations.

The method of laying has very little effect upon undulatory wear.

Rubber plates have very little effect on the development of undulatory wear.

It has been found possible to reproduce undulatory wear in the laboratory; however, the trials not being completed as yet, it is premature to formulate any conclusions.

At the request of Messrs. KUMAR and FEYRABEND, certain changes in the order of this Summary were adopted.

Mr. FEYRABEND asked for the deletion in paragraph 3 of the words « remain exempt or are only slightly affected », saying that in his opinion no type of rail can really be free of undulatory wear.

In addition, he also asked for the deletion of paragraph 6, to conform with the conclusions resulting from discussion of Summary No. 19.

Mr. KUMAR indicated certain modifications to the English version, and the text of Summary No. 20 was adopted having regard to all the comments recorded above.

— Summary No. 20 was worded as follows :

« 20. It has been found possible to reproduce undulatory wear in the laboratory. Researches and trials on small sections have recently been started by some Administrations, but it is too early to formulate any final conclusions. However, the following indications have been obtained :

« — The chemical composition, heat treatment and method of fabrication have an effect upon the various types of undulatory wear.

« — Certain rails, specially those made of Thomas steel, show pronounced undulatory wear, whilst rails made of Martin-Siemens steel with a low nitrogen content remain almost free.

« — The behaviour of rails made of Thomas steel, manufactured with an oxygen rich blast, is similar to that of Martin-Siemens rails.

« — There appears to be a correlation between the increased stressing of rails during the process of straightening during manufacture and the production of nascent corrugations.

« — In places where undulatory wear exists, the period of natural vibrations of the vehicles does not seem to correspond to vibrations which would be produced by corrugations.

« — The method of laying has very little effect upon undulatory wear.

« — Rubber pads have very little effect on the development of undulatory wear. »

The PRESIDENT thanked the Delegates who took part in the discussions as well as the REPORTERS.

— The meeting ended at 12 noon.

— The complete text of the Summaries adopted is shown hereafter :

## SUMMARIES.

### I. Types and characteristics of undulatory wear of rails.

« 1. The different types of undulatory wear can be classified into two groups :

« (a) Short wave undulatory wear, the length of wave being 0.02 to 0.08 m (0.08 to 3.1 in.) (most frequently 0.043 m = 1.7 in.), and the depth 0.12 mm (0.005 in.) (maximum of 0.4 mm = 0.02 in.).

« (b) Long wave undulatory wear, with which the length of wave varies between 0.10 and 2 m (3.9 in. and 6 ft. 7 in.), the depth being 5 mm (0.2 in.) and over.

« 2. The commencement and development of undulatory wear are extremely complex phenomena which it is very difficult to explain completely.

« The factors which can have an influence upon undulatory wear are essentially :

« (a) the material and method of fabrication of the rails;

« (b) vibrations of the rail;

« (c) rail-wheel pressure and reactions of the rail-wheel system under the influence of the rolling stock;

« (d) oxidation due to friction;

« (e) the rolling stock;

« (f) the profile of the lines;

« (g) the kind of traffic;

« (h) the method of laying;

« (i) the rigidity of the bed.

« 3. The damage caused by undulatory wear is far from negligible and is worth taking into consideration.

« Most of the railways have found that on lines showing serious undulatory wear there is rapid general deterioration of the track, loosening of the rail fastenings, coachscrews and bolts,

« ovalisation of the coachscrew holes,  
« loosening of the anti-creep devices,  
« disturbance of the bed, sleepers and  
« ballast.

« It can definitely be stated that more  
« rapid deterioration of the sleepers has  
« been noted in sections with serious  
« undulatory wear.

« 4. Again, loosening of bolts and  
« rivets in metal bridges has been ob-  
« served.

« 5. In general, the vibrations set up  
« by undulatory wear have a destructive  
« effect upon the various parts of the  
« rolling stock, but it is difficult to eva-  
« luate the extent of the damage caused.

## II. Investigation into the causes of undulatory wear.

« 6. The composition of the metal  
« plays an important part in the forma-  
« tion of undulatory wear. For exam-  
« ple, Martin-Siemens rails are generally  
« less subject to short wave undulatory  
« wear than Thomas steel rails. A low  
« nitrogen content improves the resist-  
« ance to wear of rails manufactured by  
« these two processes. Heat treated  
« rails are more vulnerable to it than  
« those which have not been so treated.

« 7. Rails which have been straight-  
« ened upright during manufacture tend  
« to show more marked undulatory  
« wear.

« 8. Undulatory wear affects rails of  
« all weights. Short wave undulatory  
« wear may perhaps be more apparent  
« with heavy rails.

« 9. In general, welded track shows  
« no appreciable differences from the  
« point of view of undulatory wear  
« compared with ordinary non-welded  
« track.

« 10. Certain observations make it  
« possible to state that the use of check-  
« rails results in a certain reduction in  
« the depth of long wave undulatory  
« wear.

« On the other hand, it appears that  
« short wave undulatory wear disappears  
« in line with level crossings equipped  
« with check-rails.

« 11. The rail joints whether fish-  
« plated or welded are disturbing in-  
« fluences, though to a different degree,  
« but the data collected being contra-  
« dictory, it is difficult to state whether  
« they affect the formation or the de-  
« velopment of the waves, or both.

« 12. No conclusive information has  
« been supplied concerning the influence  
« of the sleepers. No precise law can  
« be formulated concerning the influence  
« of the material used for the sleepers  
« and the type of fastening. However,  
« it has not been proved that the kind  
« of sleepers and their method of laying  
« have any effect on the formation and  
« development of the waves.

« 13. It appears from an examination  
« of the replies that a well laid layer  
« of ballast is indicated to reduce un-  
« dulatory wear. Some Administrations  
« have found that there is an unfavour-  
« able influence on lines laid on an  
« insufficiently elastic bed (particularly  
« on rocky foundations).



« 14. The following factors favour  
« the formation of undulatory wear : the  
« unsprung weight of traction motors,  
« small diameter wheels and uniformity  
« of such diameters, braking by means  
« of cast iron shoes, conicity of tyres,  
« small spacing between driving axles.

« 15. The influence of the profile of  
« the lines cannot be determined, the  
« statements made being too contra-  
« dictory. This also applies to the  
« influence of the locality. It would,  
« however, be interesting to pursue re-  
« search particularly into the effect of  
« tunnels and sections subject to consi-  
« derable corrosion.

### III. Steps taken to avoid undulatory wear or to remedy it.

« 16. No type of existing conven-  
« tional fastening has yet been proved  
« to prevent undulatory wear. The in-  
« troduction of fastenings with elastic  
« features is of too recent origin to per-  
« mit of a conclusion being drawn with  
« regard to their effect.

« 17. Increasing the number of sleep-  
« ers does not appear to have a bene-  
« ficial effect on undulatory wear.

« 18. The practice of grinding rails  
« as an item of maintenance has been  
« adopted by many Administrations.

« 19. Heat treatment before laying,  
« by annealing, and either before laying  
« or after laying by blowlamp, is very  
« costly. Whereas the result of heat  
« treatment by annealing appears to  
« have uncertain effects, heat treatment  
« by blowlamp appears to be detri-  
« mental in the long run.

### IV. Systematic research.

« 20. It has been found possible to  
« reproduce undulatory wear in the  
« laboratory. Researches and trials on  
« small sections have recently been  
« started by some Administrations, but  
« it is too early to formulate any final  
« conclusions. However, the following  
« indications have been obtained :

« — The chemical composition, heat  
« treatment and method of fabrication  
« have an effect upon the various types  
« of undulatory wear.

« — Certain rails, specially those  
« made of Thomas steel, show pro-  
« nounced undulatory wear, whilst rails  
« made of Martin-Siemens steel with a  
« low nitrogen content remain almost  
« free.

« — The behaviour of rails made of  
« Thomas steel, manufactured with an  
« oxygen rich blast, is similar to that of  
« Martin-Siemens rails.

« — There appears to be a correla-  
« tion between the increased stressing of  
« rails during the process of straighten-  
« ing during manufacture and the pro-  
« duction of nascent corrugations.

« — In places where undulatory wear  
« exists, the period of natural vibrations  
« of the vehicles does not seem to cor-  
« respond to vibrations which would be  
« produced by corrugations.

« — The method of laying has very  
« little effect upon undulatory wear.

« — Rubber pads have very little  
« effect on the development of undu-  
« latory wear. »

— The Plenary Session ratified these  
Summaries during its meeting of the  
3rd October 1958.

### QUESTION 10.

**In view of the development of light railways, what are the means to be adopted in order to reduce the operating costs of these railways and what are the resulting basic amendments?**

- **Delimitation of electrification and dieselisation in relation to the traffic, capital costs and operating costs.**
- **Co-ordination between rail and road :**
- **Possibilities of mixed rail-road vehicles and of specialised vehicles for rail or road.**
- **Principles to be followed in regard to investment, in order to improve the returns from the capital available for the transport industry.**

#### Preliminary documents.

Report (Austria, Belgium and Colony, Bulgaria, Cambodia, Czechoslovakia, Denmark, Ethiopia, Finland, France and French Union, Western Germany, Greece, Hungary, Indonesia, Italy, Lebanon, Luxemburg, Netherlands, Poland, Portugal and overseas territories, Rumania, Siam, Spain, Switzerland, Syria, Turkey, Viet-Nam and Yugoslavia), by Dr. Eng. E. STAGNI. (See *Bulletin* for August 1958, p. 1215.)

Report (America [North and South], Australia [Commonwealth of], Burma, Ceylon, Egypt, India, Irak, Iran, Republic of Ireland, Japan, Malaysia, New Zealand, Norway, Pakistan, South Africa, Sudan, Sweden, Union of Soviet Socialist Republics, United Kingdom of Great Britain and Northern Ireland and dependent overseas territories), by S. L. KUMAR. (See *Bulletin* for July 1958, p. 1081.)

Special Report, by S. L. KUMAR. (See *Bulletin* for September 1958, p. 1446.)

#### Report of Section V.

(See *Congress Daily Journal* No. 4, p. XIV; No. 6, p.VII and XIII; and No. 7, p. XVIII.)

### Meeting held on the 2nd October 1958.

The PRESIDENT asked first of all whether Delegates had any observations of a general character to make. Various points were made which led to a long discussion. These contributions are summarised hereafter according to subject matter.

1. Mr. FARQUHARSON (*East African Railways and Harbours*), said that in view of the general development throughout the world, it would be desirable to delete the term « colonial railways » in the title of Section V (Light Railways and Colonial Railways).

Mr. UPMARK (*Swedish State Railways*) agreed with the suggestion to delete these words and requested, moreover, that the title of Section V be entirely changed. He tentatively suggested : « Special Problems of Railways with a Light Density of Traffic », and asked for this proposition to be studied further.

2. Mr. PARIBENI (*Federazione Nazionale Imprese Trasporti, Italy*) mentioned that the question of definition of light railways had already been studied by the Union Internationale des Transports Publics, particularly at the Naples Congress (1955) and at Hamburg (1957), and that it will be raised again at the Paris Congress in 1959. It would be desirable to reconcile these parallel studies.

Following some remarks by Mr STAGNI (*Reporter*), the PRESIDENT stated that these were questions for consideration by the Permanent Commission and that he would refer them to this body.

*Summary No. 1 was read:*

1. A « light railway » (chemin de fer économique) is a railway for which economy, either from the point of view of construction, or maintenance or operating, is the main consideration.

Mr. STAGNI expressed the opinion that such a definition was a matter of general interest and that it related to the title of Section V itself, as indicated above.

Messrs. SANTORO (*Italian State Railways*), DELACARTE (*French National Railways*) and PARIBENI were of the opinion that the question of definition could be avoided by stating in a preamble which categories of railways were covered by Question 10.

Certain delegates opposed this view and proposed various criteria upon which they believed the definition of light railways should be based.

*a) Light density of traffic.*

Messrs. SANCHEZ (*State Railways, Argentina*), STAGNI, FARQUHARSON, UPMARK, thought that the notion of light traffic density should be introduced into the definition of light railways.

Mr. SANCHEZ said that the definition proposed in the report could be applied to all railways. He suggested that in addition to the concept of light traffic density, such a railway is built with the minimum of initial capital outlay consistent with an acceptable level of operations.

Mr. PARIBENI was of the opinion that low traffic density could not be considered as an essential criterion, citing certain regional railway networks in Italy which, however, carry a very dense traffic.

Mr. DELACARTE quoted the case of short secondary lines feeding a considerable amount of traffic to the main line network.

b) Mr. STAGNI said that the concept of light railways had changed. Previously, the criterion had been the minimisation of construction costs, whereas at present it is mainly concerned with operating costs.

Messrs. KUMAR (*Special Reporter*) and OQUIÑENA (*Ministry of Public Works, Spain*) were in agreement with this distinction.

Mr. SANTORO also thought that the original concept of light railways had developed.

Mr. UPMARK emphasised that the need for economising was particularly important.

c) Messrs. UPMARK and STAGNI mentioned that road competition had an important bearing on the question.

d) Mr. OQUIÑENA agreed with the economic aspect of the question but requested that the regional or secondary character of such railways be mentioned.

e) Mr. LOPEZ ABUIN (*Ministry of Transport, Argentina*) observed that the conditions under which railways are established do not determine their character as light railways. In fact, all lines, even those constructed as main lines, may become light railways as a result of changing circumstances. The important factor, in his opinion, is the necessity of finding



means at a given point in time which enable a more flexible method of operating to be used.

Mr. KUMAR, attempting to include in a single definition, all the various considerations described above, proposed the following text for Summary No. 1 :

« A « light railway » is a railway with light traffic which, for its financial stability, must exercise strict economy in construction, maintenance and operation. »

— This text was put to the vote and was defeated by 24 votes to 13.

Acting on proposals previously put forward by Messrs. STAGNI and DELACARTE, the PRESIDENT asked that a small Committee of delegates should meet at the adjournment of the present meeting in order to draft a final text.

This Committee comprised the following members :

Messrs. KUMAR, *President*, UPMARK, STAGNI, DELACARTE, OQUIÑENA and LOPEZ ABUIN, *members*.

— This Committee met at 12 noon at the end of the session, and established the text of Summary No. 1 given hereafter :

« 1. The original concept of the term « light railways » has changed.

« The light railways studied here are lines which have problems different from those of main line systems on account of either the regional character of their traffic or the type of traffic requiring a simplified operation. »

#### *Summary No. 2 :*

2. From the point of view of the means to be adopted to reduce operating costs and

to determine the resulting structural changes, the following categories may be distinguished :

- 1) the light railways in countries with rapidly developing economies;
- 2) the light railways in highly developed countries :
  - a) the small networks or isolated lines operated by private companies, generally under government control;
  - b) the secondary lines belonging to large national railways, which are State operated or controlled.

Mr. KUMAR first of all suggested a simpler version of the first paragraph, indicating that the categories listed hold true whether improvements are made to methods of operation, or whether services are rationalised or not.

This first paragraph was adopted without comment.

Mr. SANCHEZ proposed to substitute in the following paragraphs the word « regions » for « countries », as within the same country there may be regions of different economic structure.

Mr. SANTORO asked what was meant by rapid economic development as many highly-developed countries can still have a rapid economic development.

Mr. DELACARTE suggested replacing the word « rapid » by « recent ».

After a discussion, with contributions by Messrs. SANTORO, KUMAR, DELACARTE, SANCHEZ, GARFIELD (*East African Railways and Harbours*), STAGNI, LOPEZ ABUIN, EYDES (*East African Railways and Harbours*), MANITTO TORRES (*Portuguese Government*), it appeared that the proposed distinction in Summary No. 2 had a

fairly clear meaning, but it was difficult to express it without using the term « under-developed countries ».

As a result, the text of Summary No. 2 was adopted as given hereafter, after having been put to the vote.

« 2. The existing light railways can be divided into the following categories :

« 1) the light railways in highly developed regions :

« a) the small networks or isolated lines operated by private companies, generally under government control;

« b) the secondary lines belonging to large national railways, which are State operated or controlled.

« 2) the light railways in regions with recently developing economies. »

#### Meeting of the 6th October 1958.

The meeting opened at 9.30 a.m.

At the request of the PRESIDENT, the text of Summary No. 1 was read, as adopted by the Sub-Committee at the end of meeting of 2nd October. (*This text is reproduced above.*)

With regard to Summary No. 2, Mr. KUMAR (*Special Reporter*) suggested reversing the order of categories 1 and 2 in order to avoid amending the references in the text of subsequent summaries and also in the report itself. This proposal was adopted and the new revised text of Summary No. 2 was adopted as follows :

« 2. The light railways can be divided into the following categories :

« 1) The existing light railways in

regions with recently developing economies.

« 2) The light railways in highly developed regions :

« (a) the small networks or isolated lines operated by private companies, generally under government control.

« (b) the secondary lines belonging to large national railways, which are State operated or controlled. »

#### Summary No. 3 :

3. On the basis of the information supplied, the light railways constitute about 22 % of the total route mileage of the countries wherein they exist.

During the last two decades, there has been very little extension of light railways, a fact which may be attributed to the rapid development of the internal combustion engine in its application to road transport.

Mr. PONCET (*Société des Chemins de fer économiques, France*), speaking in the name of Mr. DELACARTE, for whose absence he expressed regret, said that the figure of 22% given as the proportion of light railways appeared to him to be low.

Mr. STAGNI mentioned that the average proportion for the French speaking countries was 38% and Mr. KUMAR agreed that the figure of 22% certainly understated the truth, as some countries had declared that they had no light railways whereas in fact their lines undoubtedly came into this category

The text of Summary No. 3 was consequently modified.

The PRESIDENT proposed to add « mainly » in the second paragraph dealing with the cause of the small extension

of light railways. This insertion was approved.

— This Summary was adopted as follows :

« 3. On the basis of the information supplied, the light railways constitute about 22% of the total route mileage of the countries wherein they exist. It is thought however, that the true percentage is higher.

« During the last two decades, there has been very little extension of light railways, a fact which may be mainly attributed to the rapid development of the internal combustion engine in its application to road transport. »

*Summary No. 4 :*

4. Light railways of category 2 (a and b) have been reduced by 31 %. In the three categories as a whole, there has been about a 25 % reduction in the initial mileage, the substitute road services being operated by the light railways or their subsidiary companies, or by private firms, either on contract or not.

Mr. KUMAR proposed a new version of this Summary so as to indicate the reason for the reduction in mileage (declining traffic) and to say that the figures related to the last two decades. Further, he thought that the sentence regarding substitute services should be separate as it conveys a different idea.

— The new text, given hereafter, proposed by Mr. KUMAR was adopted without discussion :

« 4. Due to the declining traffic, some light railways in category 2 had to be closed down. They lost 31% of their mileage during the last two decades. In

the aggregate, the original route mileage of the two categories 1 and 2 was reduced by about 25%.

« The substitute services were provided by the road transport either run directly by the light railway companies themselves, by their subsidiaries or by private enterprise. »

*Summary No. 5 :*

5. As most of the light railways do not establish any statistics or did not supply sufficient operating data, it is not possible to formulate any general conclusions.

At the request of Mr. FARQUHARSON, and following remarks by Mr. GARFIELD, Mr. KUMAR said that by « general conclusions » was meant « general conclusions regarding their performance ».

After discussion between Messrs. SANCHEZ, STAGNI and SANTORO, this phrase was added to the text of the Summary.

Mr. KUMAR proposed a slightly different phrasing in order to distinguish between the two reasons why it was not possible to draw any conclusions.

— This new version was adopted as follows :

« 5. As some of the Railway Administrations do not maintain separate statistics for their light railways, and as many others who had, did not supply the required operating data, it is not possible to draw any broad conclusions regarding their performance. »

*Summary No. 6 :*

6. From the replies received, it appears that the following methods have been adopted to reduce the operating costs :



- a) introduction of some elements of mechanisation in laying and maintaining the permanent way;
- b) progressive abandonment of steam traction and its replacement by Diesel traction (150 to 450 HP railcars, 550 to 850 HP locomotives) and, in certain cases, by electric traction;
- c) simplification of the signalling and operating methods;
- d) doing away with the traditional subdivision of the staff into different departments (employees available for multiple duties);
- e) having the traction units driven by one man (one man cars);
- f) progressive replacement of lines remaining unprofitable despite the application of various methods of rationalisation, by road services, run as part of the railway undertaking;
- g) simplification and perfecting of the transport documents.

Mr. KUMAR proposed a modification of the first paragraph (not all the methods listed being concerned with operating costs).

Mr. WILLIAMS (*Malayan Railway Administration*) asked for the deletion of figures of horse-power given in (b), as these might not be appropriate in all cases, particularly in his own case.

Mr. OQUINENA proposed a more general version of (c).

Mr. FARQUHARSON asked for the addition to (d) of the phrase « to ensure as far as practicable the continuous employment of personnel ».

Mr. PARIBENI proposed the addition after (e) of another method which is often used concerning improvement in the exchange of rolling stock and various services between adjoining railways.

Mr. STAGNI suggested the inversion of (f) and (g), as (f) is the last method employed when all others are deemed insufficient.

Mr. PONCET asked for the following phrase to be added to (f) : « ... or under contract to road transport undertakings. » Mr. STAGNI thought that this phrase was out of place here as the method proposed for the improvement of the financial condition was of a general character. Following up this idea, he thought it possible to delete from the original text the phrase « run as part of the railway undertaking ». These various remarks would be more suitable in Summary No. 9.

After a discussion between the Delegates already mentioned above, a final text was adopted, taking into account the above arguments.

— Summary No. 6 was adopted as follows :

« 6. From replies received, it appears that the following methods have been adopted to improve the financial position of the light railways :

« (a) the introduction of some elements of mechanization in laying and maintaining the permanent way;

« (b) progressive abandonment of steam traction and its replacement by Diesel traction and, in certain cases, by electric traction;

« (c) simplification of technical, commercial and operating methods;

« (d) doing away with the traditional subdivision of the staff into different departments (employees available for multiple duties), to ensure as far as practicable the continuous employment of personnel;

« (e) having traction units driven by one man (one-man cars);

« (f) exchange of rolling stock and various services between adjoining railways;

« (g) simplification and perfecting of the transport documents;

« (h) progressive replacement of lines remaining unprofitable despite the application of various methods of rationalisation by road services. »

#### *Summary No. 7 :*

7. The dividing line between electrification and dieselisation is a matter to be decided by each undertaking. However, on the whole, it can be stated that the general tendency is towards dieselisation.

Electrification appears to be reserved for mountain lines, connections with systems that are already electrified, and for countries where the price of fuel is high.

Mr. KUMAR said that he preferred to replace the idea of a « dividing line » by « choice », which was closer to the real problem faced by the Administrations. Moreover, it seemed preferable to say « Electrification appears to be suitable... » instead of « Electrification appears to be reserved... »

Mr. SANCHEZ proposed the substitution of the word « regions » for « countries » in the second paragraph.

After a discussion between Messrs. PARIBENI, SANTORO, YTASSE (*Compagnie Générale d'Exploitations Ferroviaires et Routières, France*) WILLIAMS, STAGNI and KUMAR, on the question of the price of fuel (this price being an extremely variable factor according to local economic and political conditions), the original text was

retained with the addition of the word « particularly » in the last phrase of the Summary.

— Summary No. 7 was worded as follows :

« 7. The choice between dieselisation and electrification will vary with the local conditions. There is, in general, a preference for dieselisation.

« Electrification appears to be suitable for mountain lines, connections with systems that are already electrified and for regions where the price of fuel is particularly high. »

#### *Summary No. 8 :*

8. The financial rehabilitation of the light railways would be considerably facilitated if they enjoyed greater liberty and more flexible tariffs, as is the case in general with independent road transport services.

In certain cases, the light railways could meet competition by participating in the road services. On the other hand, the independent road transport firms should be obliged to adhere strictly to the road traffic and labour regulations and more effective fiscal and administrative control should be introduced, in order to make their respective positions equivalent and consequently equitable.

The first paragraph of the Summary was adopted without comments.

Mr. HOENS (*Vice-President*) asked for the addition of the adjective « technical » in the second paragraph before « ... fiscal and administrative control... ».

Mr. FARQUHARSON requested that the idea expressed in the second paragraph be worded more emphatically.

Mr. KUMAR agreed with this point of view and proposed the new version given hereafter, which was adopted.

« 8. The financial rehabilitation of the light railways would be considerably facilitated if they enjoyed greater liberty and more flexible tariffs, as is the case in general with independent road transport services.

« Some light railways can counter the road transport competition by participating in the road transport themselves.

« To place the railways in a position of parity and equity with the road transport services, it is necessary to impose and enforce certain technical, fiscal and administrative controls on the latter. »

#### *Summary No. 9 :*

9. If the efforts made by the light railways to improve their position have proved fruitless, a programme to replace the lines showing the greatest deficit by road services can be considered, which may eventually make up for part of the losses on the lines kept open. A mixed solution can be considered in which motor transport would replace the railway services during slack hours, so that the line can be closed down for part of the day (stations, signalling, etc.).

In certain cases, partial cancellation of the services can be considered (doing away with the passenger or freight services).

Mr. PONCET had previously made a proposal which really concerned Summary No. 9. He asked for the introduction of an additional point, previously made by Mr. DELACARTE during the meeting of 2nd October, that account be taken, when considering the problem of abandoning a line, of the longer distance traffic brought to the main railway network as well as the local traffic.

He had also pointed out that the substitute road services could be operated by the railway administration itself, by subsidiary companies and also by private companies under contract.

Mr. STAGNI proposed a new draft taking these remarks into account and introducing the possibility of abandoning certain intermediate lengths of secondary lines while operating services on the ends only.

Mr. KUMAR thought that his original text could be retained, simply adding the remarks recorded above.

After discussion between Messrs. SANTORO, UPMARK, WILLIAMS, and OQUIÑENA, the PRESIDENT noted that all Delegates were agreed on the points to be included in Summary 9 and accepted Mr. WILLIAMS proposal that the final version be drafted at the end of the meeting. The text drafted by Messrs. KUMAR, STAGNI and LOPEZ ABUIN is given hereafter :

« 9. If the efforts made by the light railways to improve their position have proved fruitless or are considered insufficient, the lines showing the greatest deficits may be abandoned.

« It is not possible to give general criteria for the abandonment of these lines. It is necessary, however, to take into account, when evaluating the statistical and economic data, not only the traffic on the line but also the longer distance traffic which a line brings to the main railway network. In some cases, it is possible to allow a partial cancellation of services (closure or demolition of certain stations, abolition of passenger or freight services), or by abandoning inter-



mediate lengths of certain lines where the service can be provided at the ends.

« A mixed solution can be considered in which motor transport would replace the railway services during slack hours, so that the line can be closed down for part of the day (stations, signalling, etc.).

« The substitute road services may be operated by the Railway Administration itself, by subsidiary companies or else by a private company under contract.

« In all cases, traffic extending over the rest of the network must be safeguarded in order to improve its financial position.

« In the case of abandonment, common agreement should be established between the railways, road and post office departments, with the consent of the local authorities, to enable the railway facilities (road beds, stations, lines of communication) to be used by the respective departments. »

#### *Summary No. 10 ;*

10. If all these combined efforts do not result in a satisfactory solution to the problem of financial stability; but if for political, strategic, topographical or climatic conditions, the line has to be kept open, it is up to the Government or other authorities concerned to take the necessary steps.

Mr. KUMAR proposed a new version of Summary 10 adding the conclusion that the steps to be taken by the Government or other public authorities concerned should include payment of a fixed subsidy.

The PRESIDENT thought that the intervention by public authorities need not necessarily lead to a subsidy and proposed a more general draft stating simply « effective measures to remedy the situation ».

— The following text was adopted :

« 10. Should all efforts at financial rehabilitation fail and yet a railway line is required to be retained for political, strategic, geographical or climatic reasons, the Government or other public authorities concerned should take effective measures to remedy the situation. »

#### *Summary No. 11 :*

11. The grouping together of all the light railways of a country is a matter deserving consideration, so long as this is compatible with greater flexibility and greater freedom of action as regards the simplification of operating measures, and the rationalisation of the services and tariffs.

Mr. TUJA (*Union Internationale des Chemins de Fer*) had previously made a proposal which was relevant to Summary No. 11.

« The retention in certain countries of private enterprise for some secondary lines is justified by the experience of these companies in this field and by the special facilities available to them. »

MESSRS. STAGNI, KUMAR and LOPEZ ABUIN did not agree with this proposal. They thought that the measures indicated in Summary No. 11 did not depend on the legal standing of the operator.

After a discussion in which MESSRS. SANTORO, SANCHEZ, PONCET, YTASSE, OQUINENA, PARIBENI and those mentioned above took part, the PRESIDENT put Mr. TUJA's amendment to the vote. This was defeated by 21 votes to 14.

Mr. HOENS asked that the grouping of railways mentioned in Summary No. 11 be explained as necessary for reducing

total costs, especially for reducing duplicate employment.

Mr. STAGNI thought that such groupings were conducive to a reduction of general expenses and to a better utilisation of fixed installations and rolling stock.

— This last proposal was agreed and the final text given hereafter was adopted.

« 11. The grouping together of light railways is a matter deserving consideration, so as to obtain a reduction of general costs and a better utilisation of fixed installations and rolling stock, so long as this is compatible with greater flexibility and greater freedom of action as regards the simplification of operating measures, and the rationalisation of the services and tariffs. »

*Summary No. 12 :*

12. In the case of certain national systems, the advisability of separating, within the system itself, the light railway lines from the main lines, as regards the regulations operating and accounts, is under consideration.

— Adopted without alteration.

*Summary No. 13 :*

13. The standards which can be applied in order to obtain satisfactory and efficient rail-road co-ordination depend upon those factors forming the advantages road transport possesses over the light railways: door to door services, greater flexibility, simplification of relations with clients, reduction to the minimum of indirect and general costs, lower capital investments.

The technical measures and organisation measures which may be considered in the case of rail-road co-ordination involve the intervention of the main line railway.

In addition, the Government must inter-

vene effectively in order to avoid competition against the lines finally maintained in service.

Mr. SANTORO thought that it was not necessary to enumerate the advantages of road transport.

Mr. KUMAR proposed a new version of Summary 13 to make the two ideas contained in it more explicit. The first point concerned the action to be taken by the railway administration itself, the second referred to the duty of the Government.

After remarks by Mr. STAGNI, Mr. KUMAR'S new text was adopted as follows :

« 13. (a) In order to improve the economic conditions, the light railways should emulate the road transport system by providing facilities such as door to door services, greater flexibility and simplification of relations with the clients and by reducing to a minimum the indirect and general costs and the capital investments.

« (b) It is necessary for the national or central government to intervene to achieve effectively rail-road co-ordination. Particularly it is their duty to protect from harmful road competition, those lines which have to be retained in operation.

*Summary No. 14 :*

14. In order to improve the returns from the capital available for the transport industry, the following principles should govern any investments :

a) to develop in extent and improve in quality the inland road network, in order to absorb the traffic (passenger and freight) from the secondary lines to be closed down, rather than make important

great and long motor arteries for heavy motor transport, parallel to the main lines of the main railways;

- b) to orientate motor construction and road traffic standards towards limiting the dimensions and loads of road vehicles, so as to avoid the development of large capacity motor vehicles and trailers, whose presence upon the roads is the cause of the inadequacy of the road network and involves capital expenditure upon new roads to a far greater extent than would be needed for private vehicles and vehicles of average tonnage.

Such measures are within the competence of the Governments.

Mr. KUMAR proposed a new draft expressing more strongly and precisely the duty of the Government in connection with the construction, widening or strengthening of roads wherever they run parallel to railway lines.

Messrs. FARQUHARSON, STAGNI, OQUINENA and UPMARK preferred the original version which was less affirmative.

Mr. LOPEZ ABUIN was of the contrary opinion, stating that a Railway Congress should clearly state its position with regard to such a problem.

He asked in addition to add a point (c) dealing with the necessity for drawing up precise programmes to ensure that the public interest is safeguarded when the installations of closed lines are abandoned.

After a discussion it was agreed that this proposal should be included in Summary 9 to be drafted at the end of the meeting.

After further discussion the original text of Summary No. 14 was adopted without amendment, in accordance with the views of a large majority of the Delegates present.

The meeting closed at 12.45 p.m., the PRESIDENT having thanked the *Reporters* for their efficient work, the Delegates for their pertinent remarks and the Secretariat of the section for their efficient translation and recording of the proceedings.

— The complete text of the Summaries adopted is given hereafter :

### SUMMARIES.

« 1. The original concept of the term « light railways » has changed.

« The light railways studied here are « lines which have problems different « from those of main line systems on account of either the regional character « of their traffic or the type of traffic « requiring a simplified operation.

« 2. The light railways can be divided « into the following categories :

« 1) The existing light railways in « regions with recently developing economies.

« 2) The light railways in highly developed regions :

« (a) the small networks or isolated « lines operated by private companies, « generally under government control.

« (b) the secondary lines belonging « to large national railways, which are « State operated or controlled.

« 3. On the basis of the information « supplied, the light railways constitute « about 22 % of the total route mileage « of the countries wherein they exist. It « is thought, however, that the true percentage is higher.



« During the last two decades, there  
« has been very little extension of light  
« railways, a fact which may be mainly  
« attributed to the rapid development of  
« the internal combustion engine in its  
« application to road transport.

« 4. Due to the declining traffic,  
« some light railways in category 2 had  
« to be closed down. They lost 31 %  
« of their mileage during the last two  
« decades. In the aggregate, the original  
« route mileage of the two categories 1  
« and 2 was reduced by about 25 %.

« The substitute services were pro-  
« vided by the road transport either run  
« directly by the light railway companies  
« themselves, by their subsidiaries or by  
« private enterprise.

« 5. As some of the Railway Admi-  
« nistrations do not maintain separate  
« statistics for their light railways, and  
« as many others who had, did not sup-  
« ply the required operating data, it is  
« not possible to draw any broad con-  
« clusions regarding their performance.

« 6. From replies received, it appears  
« that the following methods have been  
« adopted to improve the financial posi-  
« tion of the light railways :

« (a) the introduction of some ele-  
« ments of mechanization in laying and  
« maintaining the permanent way;

« (b) progressive abandonment of  
« steam traction and its replacement by  
« Diesel traction and, in certain cases,  
« by electric traction;

« (c) simplification of technical, com-  
« mercial and operating methods;

« (d) doing away with the traditional  
« subdivision of the staff into different

« departments (employees available for  
« multiple duties), to ensure as far as  
« practicable the continuous employment  
« of personnel;

« (e) having traction units driven by  
« one man (one-man cars);

« (f) exchange of rolling stock and  
« various services between adjoining  
« railways;

« g) simplification and perfecting of  
« the transport documents;

« (h) progressive replacement of lines  
« remaining unprofitable despite the  
« application of various methods of  
« rationalisation by road services.

« 7. The choice between dieselisation  
« and electrification will vary with the  
« local conditions. There is, in general,  
« a preference for dieselisation.

« Electrification appears to be suit-  
« able for mountain lines, connections  
« with systems that are already electri-  
« fied and for regions where the price  
« of fuel is particularly high.

« 8. The financial rehabilitation of  
« the light railways would be consider-  
« ably facilitated if they enjoyed greater  
« liberty and more flexible tariffs, as is  
« the case in general with independent  
« road transport services.

« Some light railways can counter the  
« road transport competition by partici-  
« pating in the road transport them-  
« selves.

« To place the railways in a position  
« of parity and equity with the road  
« transport services, it is necessary to  
« impose and enforce certain technical,  
« fiscal and administrative controls on  
« the latter.

« 9. If the efforts made by the light  
« railways to improve their position have  
« proved fruitless or are considered in-  
« sufficient, the lines showing the  
« greatest deficits may be abandoned.

« It is not possible to give general cri-  
« teria for the abandonment of these  
« lines. It is necessary, however, to  
« take into account, when evaluating the  
« statistical and economic data, not only  
« the traffic on the line but also the  
« longer distance traffic which a line  
« brings to the main railway network.  
« In some cases, it is possible to allow  
« a partial cancellation of services (clo-  
« sure or demolition of certain stations,  
« abolition of passenger or freight servi-  
« ces), or by abandoning intermediate  
« lengths of certain lines where the ser-  
« vice can be provided at the ends.

« A mixed solution can be considered  
« in which motor transport would re-  
« place the railway services during slack  
« hours, so that the line can be closed  
« down for part of the day (stations,  
« signalling, etc.).

« The substitute road services may be  
« operated by the Railway Administra-  
« tion itself, by subsidiary companies or  
« else by a private company under  
« contract.

« In all cases, traffic extending over  
« the rest of the network must be safe-  
« guarded in order to improve its finan-  
« cial position.

« In the case of abandonment, com-  
« mon agreement should be established  
« between the railways, road and post  
« office departments, with the consent  
« of the local authorities, to enable the  
« railway facilities (road beds, stations,

« lines of communication) to be used by  
« the respective departments.

« 10. Should all efforts at financial  
« rehabilitation fail and yet a railway  
« line is required to be retained for  
« political, strategic, geographical or cli-  
« matic reasons, the Government or  
« other public authorities concerned  
« should take effective measures to  
« remedy the situation.

« 11. The grouping together of light  
« railways is a matter deserving consi-  
« deration, so as to obtain a reduction  
« of general costs and a better utilis-  
« ation of fixed installations and rolling  
« stock, so long as this is compatible  
« with greater flexibility and greater  
« freedom of action as regards the sim-  
« plification of operating measures, and  
« the rationalisation of the services and  
« tariffs.

« 12. On some national railway sys-  
« tems the advisability of separating  
« within the system itself, the light rail-  
« way lines from the main lines as  
« regards the regulations, operating and  
« accounts, is under consideration.

« 13. (a) In order to improve the eco-  
« nomic conditions, the light railways  
« should emulate the road transport sys-  
« tem by providing facilities such as  
« door to door services, greater flexibility  
« and simplification of relations with the  
« clients and by reducing to a minimum  
« the indirect and general costs and the  
« capital investments.

« (b) It is necessary for the national  
« or central governments to intervene to  
« achieve effectively rail-road co-ordi-

« nation. Particularly it is their duty  
« to protect from harmful road compe-  
« tition, those lines which have to be  
« retained in operation.

« 14. In order to improve the returns  
« from the capital available for the  
« transport industry, the following prin-  
« ciples should govern any investments :

« (a) to develop in extent and im-  
« prove in quality the inland road net-  
« work, in order to absorb the traffic  
« (passenger and freight) from the se-  
« condary lines to be closed down,  
« rather than make important great and  
« long motor arteries for heavy motor  
« transport, parallel to the main lines of  
« the main railways;

« (b) to orientate motor construc-  
« tion and road traffic standards towards  
« limiting the dimensions and loads of  
« road vehicles, so as to avoid the  
« development of large capacity motor  
« vehicles and trailers, whose presence  
« upon the roads is the cause of the in-  
« adequacy of the road network and  
« involves capital expenditure upon new  
« roads to a far greater extent than  
« would be needed for private vehicles  
« and vehicles of average tonnage.

« Such measures are within the com-  
« petence of the Governments. »

— The Plenary Meeting ratified these  
Summaries during its meeting of the  
7th October 1958.

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# SUMMARY REPORT OF THE DISCUSSIONS AT THE GENERAL MEETINGS

(October 3 and 7, 1958.)

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*President* : Sr. D. Agustín PLANA.

*General Secretaries* : Messrs. P. GHILAIN and J. PEREZ POZUELO.

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**Meeting held on October 3, 1958.**

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The session opened at 9.35 a.m. under the chairmanship of Sr. D. A. PLANA SANCHO, President of the Board of the RENFE, President of the Session.

The Assembly examined successively the various items on the agenda.

1. *Increase in the number of mandates of the Permanent Commission.*

Mr. GHILAIN, *General Secretary*, asked the Assembly to ratify the decisions taken by the Permanent Commission at its meetings on 4th June, 1956, 7th December, 1957, 2nd June and 29th September, 1958, concerning the allocation of five new mandates, viz : — one to the Union of Soviet Socialist Republics, one to India, two to Spain and one to Poland.

In addition, Sr. D. A. PLANA SANCHO, President of the Board of the R.E.N.F.E., becomes an ex-officio member of the Permanent Commission, as he assumed the office of President of the XVIIth Session.

— The Assembly agreed.

2. *Ratification of the Mandates conferred by the Permanent Commission between the last two Sessions (London and Madrid.)*

Mr. GHILAIN stated that the following mandates, conferred by the Permanent Commission in the interval between the two Sessions (London 1954 and Madrid 1958) are submitted for ratification by the Plenary Meeting :

*Nominated on May 26, 1954 :*

Mr. A. BROUCKAERT.

*Nominated Members of Honour on May 26, 1954 :*

Lord HURCOMB;

Mr. P. GHILAIN.

*Nominated on November 13, 1954 :*

Messrs. Moussa ARAFA (replaced);

Fathy RADWAN;

H.E. SIMPSON;

Manabu KANEMATSU (replaced);

G.H. DIJKMANS van GUNST

J. SVAGEL;

J.P. MUSQUAR.

*Nominated on October 22, 1955 :*

Messrs. E. CLAREMBAUX;  
 P.E.N. SKOV;  
 W. WHITE;  
 G. PANDE (replaced);  
 A. ATTISANI;  
 A. FLORENA.

*Nominated on June 4, 1956 :*

Messrs. GAMAL SALEM (replaced);  
 ISOZAKI (replaced);  
 R.F. MARRIOTT;  
 GEHORSAM (replaced).

*Nominated on December 1, 1956 :*

Mr. I.A. IVANOV.

*Nominated on December 7, 1957 :*

Messrs. H.M. OEFTERING;  
 Mostafa KHALIL;  
 Abdel Moneim AZMY;  
 Agustin PLANA;  
 P.C. MUKERJEE;  
 H. SAITO;  
 W. WYRZYKOWSKI;  
 H. BORN.

*Nominated on June 2, 1958 :*

Messrs. Mohamed Halim El-RASHID;  
 Mohamed AFIFI;  
 Brig. Ch. A. LANGLEY;  
 E.T. AALTO.

*Nominated on September 29, 1958 :*

Messrs. E. DERIJCKERE;  
 P. RENAUD;  
 D.F. LOOMIS;  
 P. LORENZO OCHANDO;  
 J. PUIG BATET;

J. RATTER;  
 A.R. DUNBAR;  
 Z. MODLINSKI.

— *These nominations were approved by the Assembly.*

3. *Renewal of the mandates expiring at XVIIth Session.*

(Art. 6 of the Rules and Regulations.)

The *General Secretary* stated that according to the Rules and Regulations, one third of the members of the Permanent Commission shall retire at each Congress and shall be eligible for re-elections. The mandates of the following Members of the Permanent Commission have come to an end :

Sir Gilmour JENKINS;  
 Messrs. R. BESNARD;  
 A. BROUCKAERT;  
 J. de AGUINAGA;  
 J.M. GARCIA LOMAS;  
 K.W.C. GRAND;  
 H. GSCHWIND;  
 M. JACOBSHAGEN;  
 R. KUNZ;  
 R. LÉVI;  
 M. MALDEREZ;  
 H. SAITO;  
 H.E. STOKKE;  
 J. SVAGEL;  
 Sir J. Landale TRAIN;  
 Messrs. E.G.J. UPMARK;  
 F.P. VILLAMIL.

All the above-mentioned members have accepted the renewal of their mandate, except Sir Landale TRAIN and Mr. R. LÉVI, both retiring in the near future.

— *Approved with applause.*

4. *Approval of the accounts of the XVIth Session (Years 1951 to 1954).*

Mr. GHILAIN stated that the accounts for the XVIth Session were submitted to the Permanent Commission during its meeting on 22nd October, 1955, with a report prepared by the Auditors appointed during the London Congress.

— *The accounts were approved by the Assembly.*

5. *Appointment of Auditors for the accounts of the XVIIth Session.*

The Assembly approved the appointment of Mr. GILLESPIE Chief Railway Accountant, British Transport Commission and Mr. HOULEZ Chef Adjoint de la Comptabilité Générale et des Finances à la Société Nationale des Chemins de

fer français as Auditors for checking the accounts of the XVIIth Session.

6. *Examination of the summaries adopted in the various Sections.*

The PRESIDENT proposed to the Assembly the approval of the summaries adopted in the various Sections.

Mr. GHILAIN read out the summaries for questions :

1, 3, 5, 7 and 9.

— *The Assembly ratified these summaries without comment.*

7. *Miscellaneous.*

As no delegate raised any further question, the PRESIDENT thanked the delegates for their attention and the meeting closed at 11.30 a.m.

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**Meding held on October 7, 1958.**

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The session opened at 11 a.m. under the chairmanship of Mr. A. PLANA, President.

The PRESIDENT called upon Mr GHILAIN to expose the first item of the agenda.

1. *Choice of venue for the next Congress.*

Mr. GHILAIN, *General Secretary*, stated that invitations to hold a Session in India and in the German Federal Republic have been received.

The Permanent Commission asked the Assembly for delegation to solve this

question, because it has not been able to examine these proposals.

— *This proposal was accepted.*

2. *Approval of the Summaries adopted in the various Sections after the Plenary Meeting of October 3, 1958.*

Mr. GHILAIN read out the summaries for questions 2, 4, 6, 8 and 10.

— *The Assembly approved these summaries.*

As no delegate raised any further question, the President thanked the delegates for their valuable contribution to and their attendance at the meetings.

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# CLOSURE OF THE SESSION.

(7th October, 1958).

The closing ceremony on the XVIIth Session was held in the « Assembly Hall » of the Trade Union House, on Tuesday, October 7, at 4.30 p.m.

The event was presided by *His Excellency the Head of the Spanish State*, GENERALÍSIMO FRANCO, who was greeted with loud cheers by all the Congressists. Besides him, on the centre dais, sat the Minister of Public Works and the General Secretary of the Party; Mr. PLANA, Under-Secretary of Public Works and Chairman of the XVIIth Session; Mr. DE VOS, Chairman of the International Railway Congress Association; Mr. LORENZO OCHANDO, General Manager of Railways, Tramways and Road Transport, and Vice-President of the Local Committee; Mr. GARCIA LOMAS, President of the Executive Committee, and Vice-President of the Board of the RENFE; Mr. PÉREZ POZUELO, General Secretary of the Organizing Local Commission; and Mr. GHILAIN, General Secretary and Member of Honour of the International Railway Congress Association.

On another platform were the Ministers of the Air Forces, Industry, Interior, Navy, Work and Agriculture.

Mr. KRAHE, Vice-president of the Executive Committee; Mr. DE LASALA, Deputy General Secretary of the Local Commission; the Presidents of the various Sections; the members of the Executive Committee of the Association; Messrs.

GOURSAT, CREM, Sir John BENSTEAD, Si Gilmour JENKINS and Mr. DORGES as well as Mr. LÓPEZ ABUIN, Minister of Transport of the Argentina Republic, also occupied preferential seats on the dais.

Mr. A. PLANA, Chairman of this XVIIth Session, opened the meeting and delivered the following speech :

« Excellency,

« After these days of feverish activity when the technical sessions alternated with visits and excursions, organised to provide the Delegates with a well-deserved rest as well as the accompanying members of their family, the XVIIth Session of the Congress is coming near its end, which enables me to fulfil the most honourable mission of all. I have the most gratifying task, as the President of this XVIIth Session of our Congress, to assure you, Excellency, of our deep gratefulness and of the appreciation of all Delegates for the great honour which you bestow upon us by presiding this Session as the Head of the Spanish State and Honorary President of this Congress. I should like to convey to you the outstanding satisfaction of all Delegates and I am convinced to speak on behalf of all of them by expressing to you also our most enthusiastic support which has already been well conspicuous from the acclamations with which, Excellency, the Congress greeted you.

« We come to the end of this XVIIth Session of the Congress and of our Closing Meeting with the satisfaction of having contributed to the achievement of a meritorious task intended to enrich the already vast heritage of the railway knowledge with new conclusions based on and preceded by arduous preliminary studies and perfected in discussions of greatest scientific interest. It is also a rare satisfaction for me, Excellency, to be able to proclaim that these new conclusions of outstanding scientific value and decisive importance for the railway technique of the world have been associated here with the name of Spain as a result of the Permanent Commission of the Association having accepted Madrid as the seat of this XVIIth Session which will be closed now. »

*The speaker makes a description of the various subjects dealt with in each Section, and continues his speech as follows :*

« The outsider who is not familiar with railway problems might be surprised to know that there are still in our days so many new points to be cleared up but those who are aware of the structure, mission and working of the railways will certainly also know that the task aiming at its improvement and perfection is both infinite and timeless, the same as the economic life of the countries whom the railway is to serve.

« On the other hand, the Railway embraces all branches of human knowledge, considering the activities to which it gives birth or which it stimulates and it is by contributing to all of them that it reaches its own targets.

« The railway has also a special feature

giving it fame but involving heavy commitments : its function as Public Service, and not only for reasons of this service but also for the opinion which its users will have of it, the railway has to contribute by all means available to meet the increasing needs of the users and the requirements of all economic and social spheres of the nation.

« All this also explains on the other hand the necessary and close link of this irreplaceable means of transport with the Governments, whatever the management that may operate the railway, and the need for a co-operation, a close co-operation with these Governments which has developed more and more under different aspects in the Railway Administrations of the different countries.

« I have experienced these days a very great satisfaction by presiding these Meetings. The Sessions of an International Railway Congress have some very special features : they are meetings involving intense work of investigation which was guided by Peace and Understanding among the Railway Administrations and Delegations. Peace and Understanding, irrespective of frontiers, true Peace and Understanding and that is what I wish for the world. The meetings mean « mutual efforts » for the benefit of everybody and of world transport. They were Railway Meetings, of these railways which men created in fact at a time when instinct still outweighed science, but if we come to think of it, if these railways had not been created in those days, science would certainly have invented them to-day.

« Such is the vitality of the railway.

« To preside Meetings with these features is not only an honour but also



CLOSING CEREMONY OF THE XVIIth SESSION held at the « Trade Union House ».  
Speech by Mr. Agustín PLANA, President of the XVIIth Session.





an immense satisfaction and taking into account the great and intricate problems that have been studied here, it seems as if such Meetings and such a Presidency were to involve serious difficulties; yet there was nothing of the sort and the task was an easy one thanks to the assistance and courtesy of the Delegates who made it possible that my modest person could live up honourably to the delicate duties expected from me.

« I wish to convey to all of you my deep gratitude.

« My great thankfulness in the first place to the Government, Authorities, Municipalities of Madrid and the Provinces who have so completely and spontaneously contributed by their efforts and their co-operation. To every one of you my deep appreciation for the great attentions.

« By so doing, I have to mention particularly the Vice-Presidents of the Session and General Secretaries who formed with me the Presidency; the Presidents of the different Sections who have conducted the discussions in their respective spheres with such insuperable loyalty, diligence and constancy as well as their Secretaries; the President of the Permanent Commission, Mr. DE VOS and members of same who have kindly ironed out whatever difficulties I may have encountered on my way; the General Secretary of the Permanent Commission in Brussels, Mr. GHILAIN who has not only contributed so efficiently to the success of our present Session of the Congress as a result of his long experience and capacity in organizing these International Meetings but whose activities also bear the stamp of long established most cordial relations with the Spanish rail-

waymen; my gratitude also to the General Secretaries who have assisted Mr. GHILAIN in his functions.

« And last but not least, my personal gratitude and that of the whole Congress to the members of the Local Organizing Commission and their Executive Committee and Secretariat who prepared with greatest care and enthusiasm over a long time all the countless details involved in the Organization of the Congress. In this respect, I should like to mention in particular their General Secretary, Mr. PÉREZ POZUELO and the Assistant General Secretary, Mr. DE LASALA who in closest co-operation identified themselves with the very soul of the Organization and who undoubtedly deserve all the praise and satisfaction you may have experienced of the Congress Organization.

« A special mention of gratitude goes to my closest, most enthusiastic and loyal collaborator in all these tasks of preparing and inspiring this Congress. This dear friend whom you all know was already a great figure of the previous Congress held in Madrid, in 1930, and the President of the Session in those days introduced him to you as a promise, as a young Engineer who was to hold very important future key-positions. The foresight turned true indeed and this permanently young Engineer has held these positions in the Spanish Railway Administration and in fact he still holds them. I propose an enthusiastic acclamation for him which will also contain all my own gratitude. I refer to our Vice-President of the Congress and Vice-President of the Spanish Railways, Mr. José María GARCÍA-LOMAS.

*(Standing, the Congressists gave an ovation to Mr. GARCÍA-LOMAS.)*

« The tasks of the Congress come to an end but we, railwaymen remain with much to be done, particularly with regard to the Spanish Railways and this not only as far as the development of the Modernization Scheme which I mentioned to you at the Opening Session is concerned. I believe in the future of the railways, in their vitality as I have repeatedly stated during the Congress, but I am also convinced that we all have to investigate on the true co-ordination of the different means of transport which have reached to-day an extraordinary stage of perfection, in order to give them such a shape that will allow each of them to yield the maximum efficiency.

« The RENFE of to-day is the Railway. The Railway of Spain and yet of the whole world, with smaller or greater perfections in its system. What about the future of the RENFE ? This, I cannot foretell, but what is certain is that its working will have to undergo considerable changes for the sake of co-ordination, mainly with road transport — which will ultimately benefit railway transport — by working out for the railway a formula where it can be linked up with road transport, considering that the latter has reached undoubtedly such a state of perfection, so that it is evident that the railway will have to keep pace with the same by contributing to the general scheme of improving relations between all countries.

« I have come to the point where I must take farewell of you. However, the feeling at the thought of our separation is tempered by my conviction that this is only a separation in space. I am sure that in the intimacy of your office, upon

the return to your respective countries, you will evoke your stay here when reading again the Bulletin of the Association.

« You will now set off on sightseeing-trips to different cities and places of Spain. These excursions combined with the visits you made these days to our museums, monuments and to the surroundings of Madrid will enable you to obtain an inside view into Spain's History, of this History of ours of which the Spaniards never boast but of which we are proud, for our History influenced indeed the course of World History. I sincerely hope that you will enjoy all your forthcoming trips and I also hope that you will all soon have a new opportunity of visiting again our country. My dearest wish is that you should take back to your country and cherish for ever the vision of Spain.

« When reaching this moment of our solemn separation, of the separation of so many Delegates from all over the world, I want to ask you to convey to your Heads of State the enthusiastic support and respectful regards on behalf of this Congress as well as our heartiest wishes of success and prosperity to them and to your countries. Whenever you should think of Spain and of us Spaniards, upon your return home, you may be convinced that we all work here in closest co-operation, with genuine hopes because we have an unswerving faith in our future. We all work that way because we, Spaniards, are inspired in our task, whatever our opinions — you may be sure — in greatest communion of spirit, by the example of another Spaniard, a true Spaniard, a hardworking, honourable



and intelligent genuine gentleman who has devoted his life to serving his country. This example inspires us and we follow it with all our faith. This man always deserves our gratitude, thoughts and heart. I invite the Congress to raise and give this man the most enthusiastic acclamation for the honour he has bestowed upon us by presiding us and accepting our Honorary Presidency. To Franco! »

When the long and enthusiastic cheers which met the end of this speech finally ceased, Mr. DE VOS, Chairman of the International Railway Congress Association, addressed the following words :

« Excellency,

« Ladies and Gentlemen,

« I should like to add a few words to the tribute which has been paid to the Chief of State by the President of the XVIIth Session.

« We have been greatly impressed by the remarkable headway made with the construction of the modern part of Madrid and by its wonderful University City where the young intellectuals are trained under most ideal conditions.

« We were able to note all that is being done for those in the lower income groups, in order to provide them with sports grounds, physical training centres, a modern beach, rest centres in ideal surroundings.

« Thus, body and mind are being trained at the same time.

« There is also something else which has left us with an everlasting impression : after visited the Escorial Monastery, we had the opportunity of going to the Monument erected at Cuelgamuros.

« There, in a splendid setting, we were able to get a true understanding of the spirit of your country.

« Beneath the arms of an immense cross of austere lines, surmounting the rock in which has been constructed an underground church, we were told that there would lie the heroes who gave their lives for Spain.

« This moving thought to glorify the act of making the supreme sacrifice can but inspire the living to banish *all* selfishness and to devote themselves to the common good.

« The thought which prompted such a noble impulse reveals a noble spirit; it fosters admiration and respect.

« This is yet another reason for us to feel the great honour which Your Excellency has bestowed upon us by having kindly consented to attend our closing ceremony and to assume the Presidency of Honour of the Madrid Session.

« We have already come to the end of our meeting, and it would seem that it only started yesterday. When time passes quickly, it is a sign that a great amount of work is being done. A great deal has been done during this present session and, to be convinced of this, it is merely necessary to look at the heavy agenda of our meetings and the conclusions approved during the Plenary Sessions; these conclusions cover all the questions which were included on the agenda.

« The address delivered by Mr. PLANA clearly shows the scope and the importance of the result obtained and I am indeed very glad to mention them once more, as they will give to our Spanish friends the

great satisfaction of noticing that their wonderful hospitality has produced very fruitful results.

« Our grateful thanks are extended to the Chief of State, to the Government and, in particular, to the Minister of Public Works, to the Local Commission and its Executive Committee presided over by Mr. GARCÍA LOMAS, to the members of the Permanent Commission, to the Reporters and Special Reporters, to the Chairmen of the Sections, to the Secretaries and to the staff, who have worked so hard.

« I have spoken about the Executive Committee and on this occasion, I should like to make special mention of Mr. GARCÍA LOMAS, as well as of Mr. KRAHE, who were among those who took part in the organisation of the 1930 Congress; both knew from experience the tremendous task which fell on those responsible for the organisation of such an international meeting. We are most grateful to them for having agreed to undertake once more such a tremendous task.

« Mr. A. PLANA, President of the Session, deserves very special mention for his farsightedness, inherent authority and the tact with which he presided over our work. He is not only a man of action and understanding, but he also has a gift of eloquence; the impressive speeches he delivered revealed this.

« We would also pay tribute to the General Secretaries : Mr. GHILAIN and Mr. PÉREZ POZUELO for the heavy responsibilities they had to bear. We should also like to associate with them Mr. HARRINGTON and Mr. DE LASALA and, in fact, many others should also be mentioned.

« We are now going to complete our personal contacts during the several days excursions so kindly offered by our hosts.

« This will be yet another reason for being grateful for everything which has been done on our behalf. Throughout the whole of our stay, we were able to notice that nothing was spared for our comfort and enjoyment, and you may rest assured that we fully appreciate all this and that we shall remember it always.

« The day we shall leave will indeed be a sad moment, but there are no frontiers to the bonds of friendship.

« Back in our respective countries, enriched by all the beautiful things we have seen, we shall always have memories of a friendly people and a great nation. »  
(*Loud cheers.*)

Then, Mr. VIGÓN, Minister of Public Works, made the following speech :

« Excellency,

« Others have accomplished before me, and better than I would ever be able to do it, the particularly agreeable mission of commenting on the work which has been done during the meetings of this Congress which has to-day just completed its task. And they themselves have paid tribute to you and expressed the gratitude and best wishes of the Delegates.

« For this reason, if Your Excellency agrees, I would now like to address myself to them, in order to convey to them before they leave for their own countries a farewell message which is truly Spanish.

« It is customary at these international technical meetings to find an atmosphere of friendship and cordiality between the technicians of countries which are far

apart in distance and outlook. From this brilliant technical gathering, one tends to assume that marvellous results will emerge.

« This would be a great mistake, because to begin to believe in the possibility of uniting men with the exercise of techniques, would be to give an erroneous ascendancy to technicalities, involving the risk of creating a new form of barbarism.

« In the last resort, this appeal to the technicians would be the first sign of unlimited fear in the face of boundless perspective of material well-being, turning away from the most essential question which relates to mankind and spiritual values, in effect, looking at the means without regard to the ends.

« A new conception of life would require different ethics : such ethics would not be new ones but only those which the world has known each time slavery has been imposed in one part of the globe or another.

« But this is not to say that we should limit technical progress, on the contrary; let us stimulate it with energy and resolution. Technology, has given rise in our time to great social problems in creating oppression of persons by machines.

« And it is technology placed in the service of the spirit on which we must rely to free these slaves, our brothers.

« But one must not lose sight of the fact that technology creates need: and this is why it is essential to ensure that, as a result of increasing the needs of man, the hope that satisfaction does not get more remote.

« Man freed from the slavery of the machine is faced with a new risk. Tech-

nology, in the last resort, is the father of idleness. It is definitely our duty to fill the gaps of this idleness and technology cannot do it; it is to the spirit that we must look.

« I hope that, in the short journeys that you are about to undertake across Spain, as in the case of the visits you have already made to some of our historical places, you will be able to obtain an understanding of the Spanish way of life.

« Clinging like a lichen to the old stones that you are going to see, the spirit of Spain — so often trampling with emotion — will whisper in your ear the words of our great Belief, the only Belief which can give back man his freedom. To give back to them their lost happiness.

« During your tours, you will no doubt have the opportunity of seeing some of our achievements. I will now refer in particular to the achievements in the railway world. They are doubtless very modest, but our aspirations are, if I may say so, limitless. Our plans emerge from our aspirations but it must be said that our plans are not precisely and always government programmes.

« Personally, I am not keen on making promises. But the wishes and aims are so numerous that, after having stated them all, there would not be time to implement any of them.

« I know well that — and I believe it is regrettable — that everyone does not share this viewpoint; if you have glanced through the pages of our newspapers, you will have seen during the last few days, on the occasion of this Congress, that sufficient has been said about plans, projects and even figures.

« I shall refrain from mentioning



figures, projects or plans because, amongst other reasons, such questions are for the Government. I merely wish to say, because I am absolutely convinced of it, that when perhaps in a few years time you come back to Spain for another Congress, you will find in an ordered and united country railway achievements among the best in the world. I strongly hope that during your stay in Spain you have been able to appreciate what our

Regime has done for our country and our economy, and may I point out that for all this we pay tribute to the wisdom and foresight of our Caudillo. (*Prolonged applause.*)

Then, His Excellency the Generalissimo FRANCO proclaimed the closing of the XVIIth Session.

His Excellency left the room in the middle of an enthusiastic ovation given by all the Delegates, standing up.

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# List of Members of the Permanent Commission

## OF THE

## INTERNATIONAL RAILWAY CONGRESS ASSOCIATION

after the decisions taken at the Plenary Meeting held on the 3rd October 1958 (Art. 6 of the Rules and Regulations), and at the Permanent Commission Meeting of the 7th October 1958.

### *President :*

M. De Vos (1), Directeur Général de la Société Nationale des Chemins de fer belges; 19, rue du Beau-Site, Bruxelles.

### *Vice-Presidents :*

J. Goursat (2), Directeur de la Région du Nord de la Société Nationale des Chemins de fer français; 18, rue de Dunkerque, Paris (X<sup>e</sup>);

M. Crem (2), Directeur du Service de l'Exploitation de la Société Nationale des Chemins de fer belges; 17, rue de Louvain, Bruxelles.

### *Members of the Executive Committee :*

E. Dorges (1), Secrétaire Général Honoraire aux Travaux Publics et aux Transports, Délégué Général aux Affaires Internationales du Ministère des Travaux Publics, des Transports et du Tourisme; 244, boulevard Saint-Germain, Paris;

Sir John Benstead (2), Deputy Chairman of the British Transport Commission; 222, Marylebone Road, London, N.W.1;

Sir Gilmour Jenkins (1), Permanent Secretary, Ministry of Transport and Civil Aviation (Great Britain); Berkeley Square House, Berkeley Square, London, W.1.

### *Ex-presidents of session, members ex-officio :*

D<sup>r</sup> Ing. G. di Raimondo, Directeur Général des Chemins de fer italiens de l'Etat (*retraité*); Rome;

Ibrahim Fahmy Kerim; Le Caire;

D<sup>r</sup> W. Meile, ancien Président de la Direction générale des Chemins de fer fédéraux suisses; Brugglerweg, 11, Berne;

A. Plana, Sous-Secrétaire d'Etat aux Travaux Publics et Président du Conseil d'Administration du Réseau National des Chemins de fer espagnols; Madrid.

General Sir Brian Robertson, Bart., G.C.B., G.B.E., K.C.M.G., K.C.V.O., D.S.O., M.C., Chairman, British Transport Commission, 222, Marylebone Road, London, N.W.1.

### *Members :*

E.T. Aalto (1), Directeur Général des Chemins de fer de l'Etat de Finlande; Helsinki;

Mohamed Afifi (1), Directeur Général Adjoint des Chemins de fer de la République d'Egypte; Le Caire.

Abdel Moneim Azmy (1), Sous-Secrétaire d'Etat au Ministère des Communications d'Egypte; Le Caire;

Sir John Benstead (already named);

R. Besnard (3), Chef de Service adjoint au Directeur général des Chemins de fer et des Transports, Ministère des Travaux publics, des Transports et du Tourisme; 244, boulevard Saint-Germain, Paris;

David Blee (1), General Manager, London Midland Region, British Railways; Euston Station, London, N.W.1;

Dr. H. Born (2), Directeur de l'Union d'Entreprises Suisses de Transports; Bundesgasse 28, Berne;

Dr. L. Branca (1), Vice-Directeur Général des Chemins de fer italiens de l'Etat; Rome.

A. Brouckaert (3), Directeur du Service du Matériel et des Achats de la Société Nationale des Chemins de fer belges; 17, rue de Louvain, Bruxelles;

(1) Retires at the 18th session.

(2) Retires at the 19th session.

(3) Retires at the 20th session.

- E. **Clarembaux** <sup>(1)</sup>, Directeur du Service de la Voie de la Société Nationale des Chemins de fer belges; 17, rue de Louvain, Bruxelles;
- D<sup>r</sup> **R. Cottier** <sup>(2)</sup>, Directeur de l'Office Central des Transports Internationaux par Chemins de fer; Berne;
- T.C. **Courtney** <sup>(1)</sup>, Member of the Coras Iompair Eireann; Kingsbridge Station, Dublin;
- M. **Crem** (already named);
- G. **Csanadi** <sup>(2)</sup>, Premier Ministre Adjoint des Communications et des Postes (Hongrie); Budapest;
- D<sup>r</sup> Ing. A. **Cuttica** <sup>(1)</sup>, Directeur Général Adjoint et Conseiller d'Administration des Chemins de fer italiens de l'Etat; Rome;
- Ph. **Dargeou** <sup>(1)</sup>, Directeur Général de la Société Nationale des Chemins de fer français; 88, rue Saint-Lazare, Paris (IX<sup>e</sup>);
- J. **de Aguinaga** <sup>(3)</sup>, Directeur Adjoint du Réseau National des Chemins de fer espagnols; Madrid;
- F.Q. **den Hollander** <sup>(2)</sup>, Membre du Conseil d'Administration des Chemins de fer Néerlandais, S.A.; Utrecht;
- E. **Derijkere** <sup>(3)</sup>, Directeur du Service de l'Electricité et de la Signalisation de la Société Nationale des Chemins de fer belges; 17, rue de Louvain, Bruxelles;
- M. **De Vos** (already named);
- M. **Dias Trigo** <sup>(2)</sup>, Directeur des Services d'Exploitation et du Matériel de la Direction des Transports terrestres au Ministère des Communications du Portugal; Lisbonne;
- G.H. **Dijkmans van Gunst** <sup>(1)</sup>, Conseiller au Ministère des Transports et du Waterstaat; La Haye;
- D<sup>r</sup> Ing. G. **di Raimondo** (already named);
- E. **Dorges** (already named);
- A.R. **Dunbar** <sup>(2)</sup>, Manpower Adviser, British Transport Commission; 222, Marylebone Road, London N.W.1;
- Sir John **Elliot** <sup>(2)</sup>, Chairman of the London Transport Executive; 55, Broadway, Westminster, London, S.W.1;
- Mohamed Halim **El-Rashid** <sup>(1)</sup>, Directeur Général des Chemins de fer de la République d'Egypte; Le Caire;
- J.M. **Garcia-Lomas** <sup>(3)</sup>, Vice-Président du Conseil d'Administration du Réseau National des Chemins de fer espagnols; Madrid;
- H. **Geitmann** <sup>(1)</sup>, Präsident der Deutschen Bundesbahn; Friedrich-Ebert-Anlage, 43-45, Frankfurt (Main);
- Dr. Ing. P. **Giobbe** <sup>(1)</sup>, Directeur du Service du Personnel et des Affaires Générales des Chemins de fer italiens de l'Etat; Rome;
- J. **Goursat** (already named);
- K.W.C. **Grand** <sup>(3)</sup>, General Manager, Western Region, British Railways; Paddington Station; London, W.2;
- D<sup>r</sup> H. **Gschwind** <sup>(3)</sup>, Président de la Direction Générale des Chemins de fer fédéraux suisses; Berne;
- R. **Guibert** <sup>(3)</sup>, Directeur Général Adjoint de la Société Nationale des Chemins de fer français; 88, rue Saint-Lazare, Paris (IX<sup>e</sup>);
- F. **Hebert** <sup>(3)</sup>, Directeur Général Adjoint de la Société Nationale des Chemins de fer français; 88, rue Saint-Lazare, Paris (IX<sup>e</sup>);
- R. **Hoens** <sup>(2)</sup>, Directeur Général de la Société Nationale belge des Chemins de fer vicinaux; 14, rue de la Science, Bruxelles;
- I.A. **Ivanov** <sup>(2)</sup>, Candidat des Sciences Techniques, Directeur de l'Institut Scientifique des Chemins de fer de l'U.R.S.S.; Moscou;
- M. **Jacobshagen** <sup>(3)</sup>, Ministerialdirektor, Leiter der Betriebsabteilung in der Hauptverwaltung der Deutschen Bundesbahn; Friedrich-Ebert-Anlage, 43-45, Frankfurt (Main);
- Sir Glimour **Jenkins** (already named);
- Ibrahim Fahmy **Kerim** (already named);
- Dr. Ing. Moustapha **Khalil** <sup>(2)</sup>, Ministre des Communications d'Egypte; Le Caire;
- A. **Kriz** <sup>(1)</sup>, Ingénieur, Conseiller Supérieur de Section au Ministère des Communications de la République tchécoslovaque; Prague;
- R. **Kunz** <sup>(3)</sup>, Directeur de l'Office fédéral des transports; Berne;
- D<sup>r</sup> N. **Laloni** <sup>(2)</sup>, ancien Directeur Général Adjoint des Chemins de fer italiens de l'Etat; Rome;
- Brig. Ch.A. **Langley** <sup>(3)</sup>, Chief Inspecting Officer of Railways, Ministry of Transport and Civil Aviation; Berkeley Square House, Berkeley Square, London, W.1;

(1) Retires at the 18th session.

(2) Retires at the 19th session.

(3) Retires at the 20th session.



- D.P. Loomis (1), President. Association of American Railroads; Transportation Building, Washington, 6. D.C.;
- P. Lorenzo Ochando (3), Director General de Ferrocarriles, Tranvías y Transportes por Carretera; Madrid;
- W.H. Maass (1), Advisory Engineer to the High Commissioner for the Union of South Africa; South Africa House, Trafalgar Square, London, W.C.2.;
- L.T. Madnani (3), Railway Adviser to the High Commissioner for India in London; Government Building, Bromyard Avenue, Acton, London, W.3.;
- M. Malderez (3), Secrétaire Général du Ministère des Communications de Belgique; 17 a, rue de la Loi, Bruxelles;
- R.F. Marriott (2), Advisory Engineer, Representative of the New Zealand Government Railways, New Zealand House; 415, Strand, London, W.C.2.;
- Dr W. Meile (already named);
- Ing. Z. Modlinski (3), Sous-Secrétaire d'Etat au Ministère des Communications de Pologne; Varsovie;
- P.C. Mukerjee (1), Chairman, Railway Board, Ministry of Railways, Government of India; New Delhi;
- J.P. Musquar (2), Directeur Général de la Société Nationale des Chemins de fer Luxembourgeois; 17, rue du Nord, Luxembourg;
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- Dr. Ing. W. Wyrzykowski (2), Vice-Directeur de l'Institut Scientifique des Essais et des Recherches Ferroviaires des Chemins de fer de l'Etat Polonais; Varsovie;
- |                       |                        |
|-----------------------|------------------------|
| N..... (3) Argentina. | N..... (2) U.S.A.      |
| N..... (1) Argentina. | N..... (1) Italy.      |
| N..... (3) Bulgaria.  | N..... (3) Roumania.   |
| N..... (3) China.     | N..... (3) Switzerland |
| N..... (3) Spain      |                        |

(1) Retires at the 18th session.

(2) Retires at the 19th session.

(3) Retires at the 20th session.

*Honorary President :* **F.H. Delory**, Directeur Général honoraire de la Société Nationale des Chemins de fer belges; 2, avenue Curé Glibert, Rixensart.

*Members of Honour :* **L. Armand**, ancien Président du Conseil d'administration de la Société Nationale des Chemins de fer français;

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*General Secretary : P. Ghilain.*

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# RECEPTIONS, VISITS AND EXCURSIONS.

On the occasion of the Congress, the Local Organizing Committee organised certain visits of a technical or tourist character, to enable delegates and the ladies accompanying them to see, on the one hand, the most up-to-date achievements of the RENFE and Spanish Government, and on the other, the modern aspect or picturesque character of Madrid and its surroundings.

Each of these visits lasted some hours, transport usually being by means of motor cars from the Place de Canovas, close to the building where the sessions of the Congress were held.

Officials and technicians, assisted by interpreters or competent and courteous guides accompanied the delegates on each visit. Pamphlets published in Spanish, French or English were distributed to delegates beforehand.

Below we give a brief report of the visits made.

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## TECHNICAL VISITS.

### *TALGO train depot at Aravaca.*

When the TALGO trains were first projected, an ambitious objective was aimed at: minimum tare, safety and comfort.

In July 1958, the TALGO trains completed their eighth year in operation.

Many of the delegates had had an opportunity of travelling in a TALGO train from Irun to Madrid, so naturally the visit to the Aravaca depot gave rise to very considerable interest.

Experts gave delegates full details about the results obtained: number in service, total mileage run, etc.

The visitors rapidly split up into small groups of those technicians specially interested in one or other aspect of the question: behaviour on the track, facility of repairs, strength, etc.

### *The Madrid railway network and the underground station for the new Ministries.*

Madrid, which has nearly two million inhabitants, is served by several railway stations.

The RENFE invited delegates to visit the complex installations now being completed which include in particular: an underground station with 320 m long platforms, a 7 km long tunnel linking up the Atocha and Chamartin stations, and underneath the main streets of Madrid an underground system with numerous branch lines.

This visit was found of great interest both by civil engineering specialists and all those who are specially concerned with methods to be applied for obtaining a free flow of a large volume of traffic.

### *The Madrid-Cerro Negro steam traction and diesel traction installations.*

The Cerro Negros installations, which lie some two kilometres beyond the platforms of Madrid-Atocha station include a steam locomotive depot and a shop reserved for diesel traction.

The steam depot includes three semi or segmental roundhouses with 22 sidings with pits, a workshop with a wheel turning plant, a large coal stack as well as an up-to-date installation for stocking and distributing fuel oil (45 locomotives out of a total of 134 using this depot use such fuel).

The diesel shop is responsible for the upkeep and repair of 20 TAF trains and 10 TAF railcars, based on a programme which provides for lifting every 100 000 km and a general overhaul every 200 000 km.

This shop is completed by a diesel oil store and a spare parts store.

On the occasion of the visit to these installations, the RENFE also organised an exhibition of its most representative rolling stock: CoCo and BoBo electric locomotives, diesel locomotives for the line services and others for shunting service, steam locomotives, cafeteria-coach, various types of wagons, and a 70 t break-down crane.

The participants were able to see a demonstration of the quick change of a « Transfesa » wagon from one gauge to another.



*Permanent Exhibition  
of the National Institute of Industry.*

Created in 1941, the object of the National Institute is to encourage the establishment of new industries and the development of existing industries.

The numerous delegates who visited the Exhibition showed great interest in the photographic and statistical documentation showing the extent of the activities of the Institute.

*Installations of the Higher Council  
for Scientific Research.*

The Higher Council is composed of a series of committees each devoted to some particular aspect of scientific research: mathematics, physics, chemistry, various techniques.

The delegates were given the opportunity to visit the Central Headquarters of the Council, as well as various institutes and centres.

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### EXCURSIONS.

In addition to the technical visits listed above, tourist excursions, especially for the benefit of the ladies accompanying delegates, were organised in the afternoons.

These proved very popular and enabled many of those attending the Congress to see modern Madrid with its wide streets, gardens and parks, the university quarter, the skyscrapers and the museums, as well as the old, more picturesque parts of the city, where one feels oneself closer to the people of Madrid, their ancient customs and their traditions.

Other excursions, each occupying a whole day, carefully organised, took delegates to the monastery of the Escorial and the national monument of the « Valle de los Caídos » at Segovia — where the aqueduct and the Alcazar perched upon its rocky heights were particularly admired — and to the Palace of La Granja with its superb collection of carpets and its gardens full of monumental fountains, to Avila with its Alcazar and its ancient ramparts, to Toledo with its cathedral, its picturesque streets, its

artisans and its paintings by El Greco, to Aranjuez, etc.

All these excursions gave all those who took part in them a wonderful lesson in history, geography and art within the enchanting frame of Spanish landscapes, so full of colour and contrast.

The excursions at the end of the Congress, lasting two days, were equally impregnated in the same way with art and natural beauty.

Each excursion patronised by a large number of delegates, and carefully organised down to the smallest detail, enabled the delegates and their ladies to visit according to their choice the artistic and natural beauties of Andalousia — Cordova, Seville and Grenada — the ancient cities of Castille, or Barcelona.

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### OTHER CELEBRATIONS.

It must also be reported that the delegates had the opportunity of seeing a number of games of Basque pelota, played at the Fronton Recoletos, and that they were invited to visit the Railway Exhibition opened on the 27th September by His Excellency the Minister of Public Works, Sr. D. J. VIGON.

During the Congress, railway films from various countries were shown and aroused much interest.

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### RECEPTIONS.

*Official Reception by the Government.*

On Monday 29th September, the Spanish Government invited the delegates and their ladies to a reception in the new buildings of the Ministry of Public Works.

The brilliantly lit facades, the profusion of flags and banners, as well as the magnificent decorations of the rooms gave this celebration a magnificence which will be remembered by all those who took part.

*Reception by the Madrid Municipal Council.*

On Tuesday 30th September, the City of Madrid organised a reception in the magnificent Cecilio Rodriguez Gardens of the Retiro Park.

Delegates were received by His Worship the Mayor of Madrid, and were invited to watch a very colourful spectacle of choirs and folk dancing.

A cold buffet, served in the Park, ended the reception.

#### *The Official Banquet of the Congress.*

On Friday 3rd October, the delegates and their ladies were invited to an official dinner offered by the Local Organizing Committee in the Hall of the Stomatological School of the University City.

The dinner was presided over by His Excellency the Minister of Public Works. Amongst those present were numerous high officials of the Spanish Government.

At the end of the banquet, the Chairman of the Local Organizing Committee of the XVIIth Session made a speech in which he drew attention to the nobility of the calling of railwayman, and after paying tribute to the ladies adorning the evening, he drank a toast to the Association, and to the Peace and Prosperity of the Nations represented.

Mr. DE Vos, President of the Association, replied, and mentioned in particular the numerous historical and artistic links between Spain and Belgium, and the great debt of the railway to Spanish men of learning. He drank a toast to that great Nation,

to its Leader, and to all the railwaymen of the whole world.

His Excellency the Minister of Public Works ended with a few words of thanks.

The occasion ended with a very animated ball, in the same atmosphere of cordiality which had prevailed throughout.

#### *Gala Representation at the Zarzuela Theatre.*

On the evening of Monday 6th October, delegates and their ladies attended a presentation of the opera « Marina » and the Mariemma Ballet at the Zarzuela Theatre in Madrid.

All those present were most enthusiastic about the show given on this occasion.

Organised on the eve of the solemn closing ceremony of the XVIIth Congress, this artistic festival was a fitting end to a memorable Session.

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#### *Excursions at the end of the Congress.*

After the Congress ended, those delegates who wished to prolong their stay in Spain were able to take part in one of the four excursions organised by the RENFE in collaboration with the International Sleeping Car Co and Messrs Cooks.

F. B.







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